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Review of the genus *Brycon* (Teleostei: Characoidei)

Gordon Howes
Department of Zoology, British Museum (Natural History), Cromwell Road, London SW7 5BD

Contents

Introduction

As presently recognized *Brycon* is one of the largest neotropical characoid genera, containing over 60 nominal species—of which perhaps 40 or so are 'valid' species. The genus is ill-defined, being recognized by a combination of what are most likely plesiomorph characters, ie. the presence of two inner symphysial teeth in the lower jaw, 3 or 4 rows of premaxillary teeth, premaxillaries linked *via* a convoluted symphysial joint. These characters occur in other Neotropical and African characoids and, moreover, may be lacking in some species assigned to *Brycon*. There is a wide diversity of cranial and dental morphology within the genus and it is questionable whether *Brycon* as it now stands is a monophyletic unit. This is a question to which the author has addressed himself and although some progress toward an answer has been made, it is clear that before any polarity can be applied to the salient characters identified, many more in-and out-group comparisons have yet to be made. Thus, study of phylogenetic relationships of *Brycon* will not be completed for some years.

During the course of this phylogenetic study most of the literature concerning the genus has been consulted and indexed together with data on many type specimens examined. Since no revision of *Brycon* has ever been published nor (since Eigenmann, 1910) has a complete list of species been compiled, I felt it opportune to present these collected data in the form of a review in the hope that it will serve as the basis for a future revision.

For the purpose of this review, a broad generic concept of *Brycon* is retained, viz: fishes possessing a rhinosphenoid; a single medial symphysial tooth in each dentary; 3 or 4 rows of premaxillary teeth (sometimes modified so as to appear as two rows) with the two teeth forming the inner row enlarged; principal jaw teeth tri-quinquicuspid but sometimes with the lateral cusps reduced so as to appear virtually unicuspid; the premaxillaries joined at the symphysis by a convoluted interlocking joint (with a single exception); maxillary valve tissue often papillate and convoluted; posterior myodome open ventrally with part of the eye musculature taking its origin from the basioccipital rim; frontal and parietal fonantelle present—at least in juveniles; coracoid not enlarged; supramaxilla absent (the absence of

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these two latter characters exclude, respectively, *Triportheus* and *Chalceus* which share all the other characters).

The nominal species are arranged in alphabetical order; all known references are cited together with locality. Where possible the dental pattern of each species is illustrated. The data for the type specimens examined are tabulated.

Notes on counts and measurements

SL = standard length (mm); D = maximum body depth; S–D = snout to dorsal, measured from the tip of the snout to the origin of the first unbranched dorsal fin ray; H = head length, measured from tip of the snout to the edge of the operculum; Sn = snout length, from the tip to anterior edge of the orbit; IO = least interorbital width; Ey = eye diameter; Mth = mouth width, taken between the coronoid processes of the dentary; CpL = caudal peduncle length; CpD = caudal peduncle depth; PL, VL & DL = respectively, the length of the longest unbranched rays of the pectoral, ventral and dorsal fins; AL = length of the anal fin base; P–V = distance between the origin of the pectoral and ventral fins; PP–V = the length of the pectoral fin expressed as a percentage of the pectoral-ventral distance; scales are counted from dorsal fin origin to lateral line/lateral line/below lateral line to ventral midline; gill-raker count is given as epibranchial/ ceratobranchial; vertebrae are counted as abdominal (including the 4 Weberian elements) + caudal (including fused 1st ural and preural centra), the caudal vertebrae are counted from the first to bear a haemal spine; supraneurals (predorsal bones), all elements are counted.

The proportions are shown as percentages of the standard length excepting those for the snout, interorbital, eye and mouth width which are shown as percentages of the head length.

Dental formulae

Böhlke (1958) pointed out the difficulty of interpreting in *Brycon* just which teeth belong to which row and how many rows there are. Various authors have had different opinions. Fowler (1923) for example, recognized 5 rows of premaxillary teeth in *B. guatemalensis* whereas other authors recognize 3 or 4. Böhlke (1958) identified 3 rows of teeth in *B. alburnus* (*B. acutus* of Böhlke). He interpreted the elongate tricuspid series as the outer row, the middle (2nd row) as 2 or 3 tricuspids and the inner series (3rd row) as 7 or 8 quinquicuspid-tricuspid teeth. However, Böhlke suggested that a more correct interpretation would be to consider the 3rd row as being the two enlarged teeth near the symphysis and the 2nd row as numbering 8 or so teeth. It is this latter interpretation which I have accepted, partly for convenience of description and partly from ontogenetic evidence (unpublished), and use in the following descriptions (see Figs 1, 2, 15 & 16).

The counts for the teeth are given as of one side of the jaw. If a fish has more teeth in one side than the other, then it is the maximum figure that is given. The counts are shown as: Pmx 1 = premaxillary outer row, 2 = 2nd row, 3 = 3rd, inner row; Max = maxillary; Dent = dentary teeth; formula given as 7/9/1 would read 7 large anterior teeth, 9 small posterior teeth, 1 tooth at the symphysis, forming the inner row.

Catalogue of nominal species

BRYCON Müller & Troschel, 1844

Arch. Naturgesch (1): 90

TYPE SPECIES. *Brycon falcatus* Müller & Troschel, 1844, *Arch. Naturgesch* (1): 90.

ETYMOLOGY. Gr. *brykon* = gnasher of teeth.

SYNONYMY. .*Chalcinopsis* Kner, 1863
Megalobrycon Günther, 1869

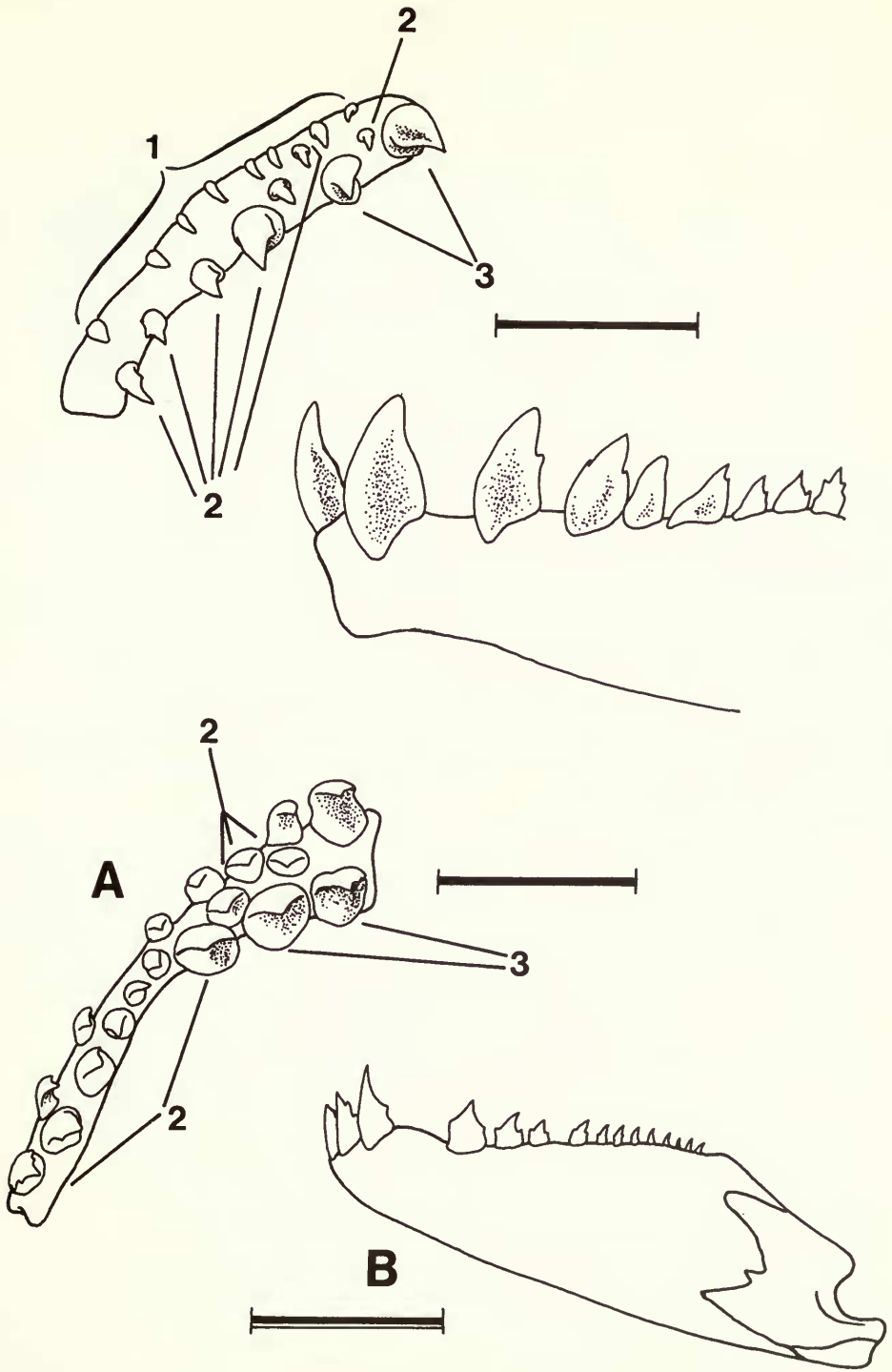


Fig. 1 (upper) *Brycon acuminatus* A, right premaxilla; B, left dentary (specimen ZUSP 1533, 140 mm SL. **Fig. 2** (lower) *Brycon alburnus* A, right premaxilla; B, left dentary (specimen BMNH uncat. 167 mm SL). The numbers indicate the row to which various teeth belong. 1 = 1st, outer row; 2 = 2nd, medial row; 3 = 3rd, inner row. Scales: solid = 3 mm, divided = 10 mm.

Catabasis Eigenmann & Norris, 1900
Bryconodon Eigenmann, 1903
Othonophanes Eigenmann, 1903
Triurobrycon Eigenmann, 1909
Holobrycon Eigenmann, 1909

Brycon acuminatus (Eig. & Norris, 1900)

Catabasis acuminatus Eigenmann & Norris, 1900, *Revta Mus. Paulista* **4**: 349–362 (description; type locality, Rio Tiete, Parana basin); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 447 (reference); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 367 (reference); Roberts, 1969 *Proc. Calif. Acad. Sci.* **36** (15): 437 (description of holotype, comments on dentition); Gery, 1972, *Zool. Verh.* **122**: 55 (reference in key); Gery, 1977, *Characoids*: 331 (comments on relationships).
?*Brycon ferox* Steindachner, 1876, *Sber. Akad. Wiss. Wien* **74**: 538, pl. 4 (see note on p. 28).

DISTRIBUTION. Rio Tietê, Parana basin.

COMMENTS. *Catabasis* is included in the synonymy of *Brycon* by virtue of its possessing those characters here used to define *Brycon*, see below and p. 1.

To my knowledge, only two specimens of *B. acuminatus* are known; the holotype in the California Academy of Sciences (CAS 11894) collected from the Rio Tietê by von Ihering and another in the Museu de Zoologia da Universidade de São Paulo (MZUSP 1533).

Concerning the second specimen which forms the basis of the following description, I am informed by Dr N. Menezes that it is recorded as being collected from Taubata close to Rio Paraíba. However, there is some doubt as to the correctness of this locality. It appears that the specimen was part of a collection loaned to the California Academy in *c.* 1930 and was returned to São Paulo in 1949. The specimen was catalogued by CAS as 11867 and determined as *Acestrorhamphus brachycephalus*. Dr Menezes has pointed out to me that despite extensive collecting in both the Rio Tietê and Rio Paraíba, no further specimens have been obtained and that it seems unlikely that *B. acuminatus* occurs in both rivers which have differing ichthyofaunas.

Roberts (1969) examined the holotype but because of damage to the specimen was unable to determine the character of the lower jaw dentition. He found that all the jaw teeth lacked cusps. In specimen MZUSP 1533 minute cusps are present on both upper and lower jaw teeth (Fig. 1). The outer row premaxillary teeth are unicuspid, there are 8 on the right and 9 on the left premaxilla. Forming what I interpret as the 2nd row are 7 teeth, all somewhat larger than those of the outer row. These 2nd row teeth are virtually unicuspid, having only small basal lateral cusps; the 3rd tooth—from the symphysis—in this row is larger than the others. The '3rd row' is comprised of two enlarged, unicuspid teeth close to the symphysis. The maxillary teeth number 19–20 and are downwardly curved unicuspids. The right dentary bears 12 outer and 27 inner teeth. The teeth on the left dentary number 14 and 23 respectively. On both sides of the jaw the inner row extends as far forward as the 6th outer row (counting from the symphysis). There is a single recurved unicuspid tooth behind the first outer tooth on each dentary.

Only the first gill arch on the left-hand side remains intact; the gill-rakers number *ca* 12/13, those on the ceratobranchial are long and spinous.

The superficial resemblance between *B. acuminatus* and *B. alburnus* is striking (cf. Figs 3 & 4). Both species have the same type of elongate snout and lower jaw, and shallow 4th infraorbital. There are, however, differences in dental morphology. Whereas in *B. alburnus* the inner row premaxillary teeth are readily recognizable as typically *Brycon*-like (i.e. as in *B. falcatus*) in morphology and arrangement, in *B. acuminatus* a triserial arrangement is barely discernible (Figs 1 & 2).

Another species from South-east Brazil, *Brycon ferox* may prove to be the senior synonym of *B. acuminatus* (see p. 28).

Proportions and counts of the specimen of *B. acuminatus* MZUSP 1533 are given in Table 1.

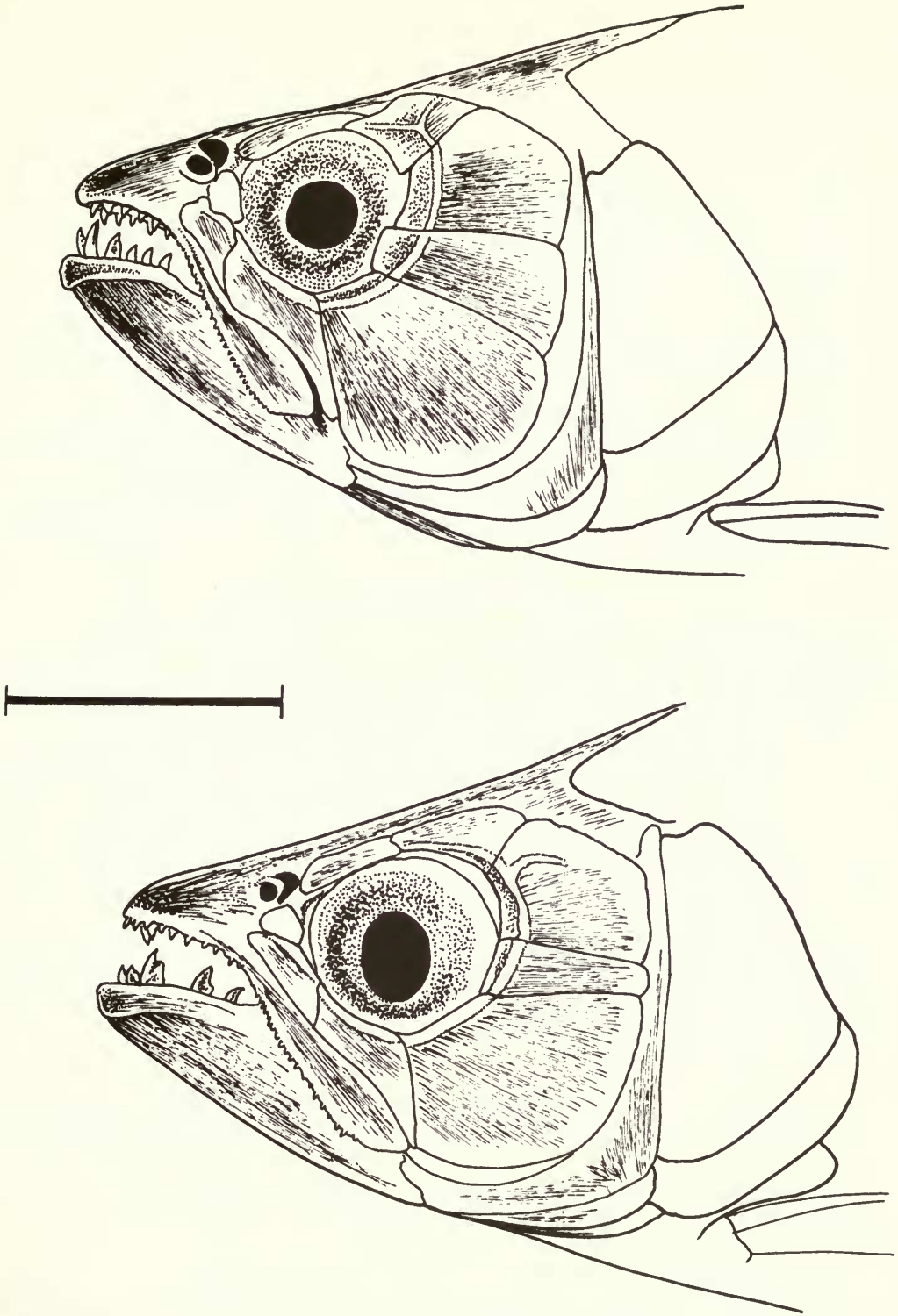


Fig. 3 (upper) *Brycon acuminatus,* head of specimen ZUSP, 140 mm SL. **Fig. 4** (lower) *Brycon alburnus*, head of specimen 1920.12.20 : 63–64, 148 mm SL. Scale = 20 mm.

Table 1 *Brycon acuminatus* counts and proportions of specimen MZUSP 1533.

SL (mm) 140			
D	29·3	Scales	10/51/6
S–D	55·7	Dorsal	ii 9
H	31·8	Anal	iv 24
Sn	30·5	Pectoral	i 13
IO	29·3	Ventral	i 7
Ey	19·0	Gill-rakers	12/13
Mth	23·6	Vertebrae	21 + 24
CpL	8·9	Supraneurals	10
CpD	10·0	Teeth:	
PL	18·5	Pmx 1	9
VL	15·0	2	7
AL	25·3	3	1
DL	22·5	Max	19–20
P–V	21·5	Dent	12–14/23–27/1
PP–V	87·0		

Brycon acutus Böhlke, 1958

A synonym of *B. alburnus*.

Brycon alburnus (Günther) 1859

Chalceus alburnus Günther, 1859, *Proc. Zool. Soc. Lond.*: 149 (description; type locality, Western Andes, Ecuador).

Chalcinopsis alburnus, Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 318 (description; type locality); Steindachner, 1892, *Denkschr. Akad. Wiss. Wien* **59**: 374–375 (description; Guayaquil); Gery, 1972, *Rev. Suisse Zool.* **79** (2): 931–932 (description; Sapo Guyas Province, Ecuador).

Brycon alburnus, Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Boulenger, 1898, *Boll. Musei Zool. Anat. comp. R. Torino* **13** (329): 4 (Rio Peripa & Rio Vinces); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Eigenmann, 1922, *Mem. Carnegie Mus.* **9** (1): 130–131 (Rio Daule, R. Vinces, R. Barranca); Rendahl, 1937, *Ark. Zool.* **29**A (11): 5–7 (Rio de Clementina, Babahoyo); Ovchynnyk, 1968, *Zool. Anz.* **181**: 245 (reference and Ecuadorian localities); Gilbert & Roberts, 1972 *A preliminary survey of the freshwater food fishes of Ecuador*: 16 & 36 (Rio Guyas drainage); Gery, 1972, *Acta Humboldtiana* no. 2: 8–9 (Rio Pilalo). Gery, 1977, *Characoids*: 335 (reference).

Brycon acutus Böhlke, 1958, *Proc. Acad. nat. Sci. Philad.*, **110**: 67, pl. 4, fig. 1 (description; type localities, Rio Quininde & Rio Cupa, Esmeraldas Province); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Ovchynnyk, 1968, *Zool. Anz.* **181**: 245 (reference, Ecuadorian localities); Roberts, 1969, *Proc. Cal. Acad. Sci.* (4) **36** (15): 438 (description of dentition); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. Esmeraldas and Guyas regions of Ecuador, ?Andean east slope.

COMMENTS. *Brycon alburnus* differs from other species currently assigned to the genus in lacking a premaxillary symphysial joint. The premaxillaries are separated by the elongate supraethmoid and are joined syndesmotically. The species also possesses a dental morphology different from its congeners, with the exception of *Brycon acuminatus*; see p. 4. The dentition of *Brycon alburnus* has been described by Böhlke (1958) and Roberts (1969) as *Brycon acutus*, and is illustrated here in Fig. 2.

Gery (1972; 1977) placed *B. alburnus* in the genus *Chalcinopsis* Kner considering (1972) that the type of that genus, *B. striatulus* was a close relative of *B. alburnus*. My observations indicate that these two species share no characters that I would consider to be derived ones.

The five type specimens of *Brycon alburnus* are in a poor state of preservation. In three the caudal fins are missing and in another the last three or four caudal vertebrae, together with

the hypurals, are also missing and thus it has not been possible to use this particular specimen for proportional measurement. Another of these three specimens (100 mm SL) has the ventral part of the body, including the pelvic fins, cut away. The only complete specimen is the largest of the five, 119 mm SL.

Colouration. On the type specimens a dense distribution of melanophores is visible on the edges of the pectorals, ventrals and across the dorsal fins. There is also a dark band along the anal fin.

In a non-type specimen from Barranca Alta (BMNH 1920.12.20: 63–4) the colour pattern is particularly well-marked. The paired fins are very dark, the pigment extending almost to their bases. The dorsal fin is crossed by a wide band which fades distally. The anal is plain along a narrow basal region, the remainder is dark, the pigment becoming intensified between the first 7 or 8 rays. The edges of the caudal fin are dark. The caudal spot extends anteriorly to a vertical extending from the last anal ray.

Synonymy: Böhlke (1958) described *Brycon acutus* from the Esmeraldas drainage. I have examined a paratype of this taxon (ANSP 75929) and find that the proportions of this

Table 2 A comparison of counts and proportional measurements between the types of *Brycon alburnus* and *B. acutus*.

B. alburnus, syntypes BMNH 1860.6.16 : 167; 180; 201–202; 204			*B. acutus*, paratype ANSP 75929
SL (mm), 119, 103, 100, 94.			85
	Range	Mean	
D	26·0–27·5	27·1	27·0
S–D	57·0–58·5	57·8	55·6
H	27·7–32·0	30·1	29·0
Sn	30·0–32·0	31·0	31·0
I.O.	24·5–25·5	24·8	24·0
Ey	24·5–27·0	25·3	24·0
Mth	22·5–25·0	23·6	24·0
CpL	10·0–13·5	11·9	13·0
CpD	8·5–9·3 (f3)	8·6	7·1
PL	18·0–24·5	22·1	20·0
VL	9·7–17·0	16·8	15·4
AL	29·5–33·0	31·2	23·5
DL	19·5–23·0	21·7	20·0
P–V	21·0–23·0 (f3)	22·2	22·5
PP–V	100·0–108·0 (f3)	104·0	89·5
Scales	12/57/7 (f2); 11/63/7 (f1)		10/56/7
Dorsal	ii 9		ii 9
Anal	iv 28 (f2), iv 30 (f1)		iv 28
Pectoral	i 12 (f3), i 13 (f1)		i 13
Ventral	i 7		i 7
Gill-rakers	9/13 (f1), 9/14 (f4)		9/13
Vertebrae	23 + 20 (f2), 23 + 21 (f1)		24 + 21
Supraneurals	11		11
Teeth:			
Pmx 1	6–7		7
2	8–10		8
3	2		2
Max	22 (f2), 23 (f1), 25 (f1)		18
Dent	7–10/9–17/1		8/14/1

NB: The fifth type specimen of *B. alburnus* (the smallest) was not used for measurement owing to loss of the caudal skeleton, but was used for fin ray and tooth counts.

specimen, together witn those of the other type specimens given by Böhlke (1958) are within the ranges of those for *B. alburnus*. There are, however, slight differences in tooth counts. Böhlke (1958) states that there are 7–9 teeth in the outer premaxillary series of *B. acutus* and from 19–21 maxillary teeth (1 count 18 on the paratype examined). In *B. alburnus* there are never more than 7 (mean 6) teeth in the outer premaxillary series and 22–25 (mean 24) on the maxilla. It seems likely that this character may reflect populational variation.

Table 3 A comparison of counts and proportional measurements between *Brycon alburnus* from the Guyas and Esmeraldas regions of Ecuador.

	BMNH 1920.12.20 : 61–62; 63–64 Guyas (R. Barranca Alta & R. Daule)		BMNH 1898.11.4 : 78–9; 2 uncat. Esmeraldas (R. Vinces; Naranjito)	
SL (mm)	173, 148; 107, 85		243, 154; 160, 157	
D	23·7–27·0	26·1	23·2–28·5	27·0
S–D	56·0–59·0	56·8	46·0–61·0	55·5
H	28·0–30·5	28·7	23·3–28·5	26·9
Sn	30·5–32·0	31·1	30·5–34·0	31·6
IO	23·0–30·5	26·5	25·5–29·5	27·0
Ey	21·3–29·0	24·8	17·7–22·0	20·9
Mth	23·0–26·5	25·0	24·5–26·5	25·2
CpL	9·4–11·5	10·5	7·8–10·8	10·0
CpD	7·6–9·5	8·5	6·5–8·9	8·3
PL	20·0–22·0	21·2	18·2–21·9	20·6
VL	14·1–15·5	14·9	12·6–15·2	13·7
AL	26·0–29·0	27·5	20·0–28·0	25·3
DL	18·5–19·0	18·7	16·9–19·6	18·6
P–V	19·5–23·5	22·2	17·5–22·0	20·8
PP–V	90·0–97·5	99·7	95·0–108·0	100·5
Scales	12/59/7 (f1); 12/60/7 (f1); 12/61/7 (f2)		13/58/7 (f1); 13/60/7 (f2); 13/62/7 (f1)	
Dorsal	ii 9		ii 9	
Anal	iv 32; iv 31; iv 30; iv 28		iv 29 (f2); iv 28 (f2)	
Pectoral	i 12 (f2); i 13 (f2)		i 12	
Ventral	i 7		i 7	
Gill-rakers	9/15 (f3); 10/14 (f1)		9/13 (f2); 9/14 (f1); 9/15 (f1)	
Vertebrae	23 + 22 (f2); 24 + 21 (f1); 24 + 20 (f1)		24 + 22; 24 + 20; 24 + 21; 23 + 22	
Supraneurals	11 (f2); 12 (f1); 13 (f1)		11 (f1); 12 (f3)	
Teeth:				
Pmx 1	6		6–7	
2	8–11		8–11	
3	2		2	
Max	23, 24, 25, 26		24 (f1); 25 (f2); 23 (f1)	
Dent	8/12–15/1		9–11/8–11/1	

Böhlke (1958) mentions an undescribed *Brycon* species from the R. Santiago (Andean east slope) which he considers as related to *B. acutus* but '. . . not as well marked a form' as that species. Again, this species may represent a populational variant of *B. alburnus* (see p. 10).

Counts and proportions for the type series of *B. alburnus* are listed in Table 2 together with those of the examined paratype of *B. acutus*. In Table 3 are listed the ranges and means of other specimens of *B. alburnus* in the BMNH collections which are representative of populations from the Rio Esmeraldas and Guyas drainages.

Brycon amazonicus (Spix) 1829

Chalceus amazonicus Spix, 1829, in Spix & Agassiz, *Selecta genera et species piscium . . . Brasiliam*: 68 (description; type locality, Amazon).
Characinus amazonicus, Spix, 1829 *ibid*, pl. 35.
?*Brycon amazonicus*, Müller & Troschel, 1844, *Arch. Naturgesch.* (1): 90; Müller & Troschel, 1845, *Horae Ichth.* 1–2: 15 (both works carry the same brief description; locality, Brasil).

DISTRIBUTION: ?Amazon.

COMMENTS. Valenciennes (1849) considered this species a synonym of *Brycon opalinus* (Cuvier). He further noted that the *Brycon amazonicus* of Müller & Troschel should probably be referred to *Brycon hilarii*.

Günther (1864) placed *B. amazonicus* tentatively in the synonymy of *Brycon opalinus*, noting the discrepancy, according to Cuvier's figure, in the size of the scales between the two species (45 lateral line scales in *B. opalinus* cf. 56–58 in *B. amazonicus*). Eigenmann & Eigenmann (1891) and Eigenmann (1910) placed *B. amazonicus* in the synonymy of *B. opalinus* without comment, a practice followed by Fowler (1950).

There is a close resemblance between Spix's (1829) description and *B. carpophagus*. It is noted that there is a discrepancy between the text and the figure in the number of branched anal fin rays. According to Spix's description they number 24 but the figure shows only 18. Since *B. amazonicus* is known only from an iconotype and Spix's description is too inadequate to identify the species with any other, the best course of action would be to regard *B. amazonicus* a *nomen dubium*.

Brycon argenteus Meek & Hildebrand, 1913

Brycon argenteus Meek & Hildebrand, 1913, *Fieldiana Zool.* **10** (8): 84 (description; type locality, Rio Aruza, Panama); Meek & Hildebrand, 1916, *Fieldiana Zool.* **10** (15): 295, pl. 25 (Rio Chorrera, Bayano and Tuyra basins); Breder, 1927, *Bull. Am. nat. Hist.* **57**: 156–163 (reference in check-list and key; Tuyra); Hildebrand, 1938, *Fieldiana Zool.* **22** (4): 285 (description and discussion); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Gery, 1977, *Characoids*: 342 (reference in key).

DISTRIBUTION: Pacific slope of Panama.

Brycon atrocaudatus (Kner & Steindachner) 1863

Chalceus atrocaudatus Kner & Steindachner in Kner, 1863, *Sber. bayer Akad. Wiss. Munchen* **2**: 227 (description; type locality, 'Westabhange der Andes im Staate Ecuador'); Kner & Steindachner, 1865, *Abh. bayer Akad. Wiss. Munchen* **10** (1): 44, pl. 4, fig. 3 (description; Western Ecuador).
Brycon atricuadatus, Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 336 (description copied from Kner & Steindachner); Starks, 1906, *Proc. U.S. natn Mus.* **30**: 777 (Peru); Pellegrin, 1912, *Miss. Geod. de l'Equateur* **9**: 135 (no locality stated); Eigenmann 1922, *Mem. Carnegie Mus.* **9** (1): 131–133, pl. 23, fig. 3 (synonymy, description; Ecuadorian and Peruvian localities); Pearson, 1937, *Proc. Cal. Acad. Sci.* (4) **22**: 90 (Jequetepeque R., Pacasmayo and Chilete, Peru); Thormählen de Gil, 1949, *Revta. Mus. La Plata* ns **5**, Zool.: 364 (reference; distribution); Hubbs, 1953, *Copeia* (3): 142 (note concerning authority).
Brycon atrocaudatus, Böhlke, 1958, *Proc. Acad. nat. Sci. Philad.* **110**: 62 (synonymy; Ecuadorian localities; discussion); Ovchynnyk, 1968, *Zool. Anz.* **181**: 245 (reference; Ecuadorian localities); Gery, 1972, *Acta Humboldtiana* **2**: 6–7 (Esmeraldas, Rio Pilalo); Gery, 1977, *Characoids*: 339 (reference in key)
Brycon scapularis Fowler, 1911, *Proc. Acad. nat. Sci. Philad.* **63**: 502, fig. 3 (description: type locality, affluent of Chimbo, near Bucay, Ecuador); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference).
Brycon ecuadoriensis Eigenmann & Henn in: Eigenmann, 1917, *Proc. Amer. Philos. Soc.* **56** (7): 687 (description; type locality, Rio Barranca Alta at Naranjito, Ecuador); Tortonese, 1939, *Boll. Musei Zool. Anat. comp. R. Univ. Torino* **47** (3) no. 89: 48 (description; Rio Mira, Ecuador).

DISTRIBUTION. Northern and southern Ecuador into Peru.

COMMENTS. Boulenger (1898) considered *Brycon moorei* to be a synonym of *B. atrocaudatus*. Eigenmann (1922) thought that the variation in scale counts as given by Boulenger indicated that he had in fact misidentified some of his specimens, namely, those from the Rio Mira, Rio Peripa and Rio Zamora, and that these represented *B. oligolepis* Regan 1913. Eigenmann was correct in his surmise as was shown by Tortonese (1939) who re-determined the Festa material that Boulenger had used as *B. oligolepis*. Furthermore, the specimens in the BMNH collections cited by Boulenger as *B. atrocaudatus* from Paramba (Rio Mira) collected by Rosenberg form part of the type series of *B. oligolepis*.

Pearson (1937) recorded the species from the mouth of the Jequetepeque on the Pacific slope of Peru.

Eigenmann (1922) included *B. scapularis* Fowler in the synonymy of *B. atrocaudatus*, an action confirmed by Böhlke (1958) who, in turn, synonymised *B. ecuadoriensis* Eigenmann & Henn.

All the specimens in the BMNH collections previously identified as *B. atrocaudatus* have been re-determined as either *B. oligolepis* or *B. moorei*.

The synonymy followed here is that of Böhlke (1958) but this may eventually prove incorrect. The type specimen of *B. atrocaudatus* cannot presently be located but a comparison of Kner & Steindachner's figure (1863, pl. 4 fig. 3) with that of Eigenmann's (1922, pl. 23, fig. 3) shows two different fishes. Differences lie in the shape of the head, length of the snout, and in colouration. There are differences also between the descriptions of Kner & Steindachner and Eigenmann. The specimen figured by Eigenmann (1922) is one of a sample from Naranjito, Ecuador which Eigenmann states 'are typical'. The Naranjito specimens differ both in colouration and meristics from the other specimens Eigenmann places in *atrocaudatus* which are from Paita. Indeed, the Paita specimens appear to more closely resemble the type specimen than do the Naranjito specimens.

I have examined a specimen from Naranjito which conforms with Eigenmann's figure and description of those specimens and I believe that it represents an undescribed taxon. It does not seem to resemble the unamed *Brycon* species of Böhlke (1958), having a longer snout and different colour pattern.

I am advised by Mr Harald Ahnelt of the Naturhistorisches Museum, Vienna, that a search has failed to trace the type specimen of *B. atrocaudatus*. Until such time as the type can be located and compared with the '*atrocaudatus*' of Eigenmann (1922) and Böhlke (1958) and with the type specimens of *B. ecuadoriensis* Eig. & Henn, which species also occurs in the Naranjito, then caution must be exercised in the application of this name.

Brycon bahiensis Günther, 1864

Brycon bahiensis Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 334 (description; type locality, Bahia); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 431 (reference); Gery, 1977, *Characoids*: 342 (reference in key).

DISTRIBUTION. Unknown.

COMMENTS. The type specimen is well-preserved and Günther's description is accurate and acceptable. However, the following notes are added together with the counts and measurements (see Table 4, and Fig. 5).

Dentition. The outer row of premaxillary teeth numbers 11–12, the teeth peg-like and feebly tricuspid. The second row has 8, and the third, 2 teeth. The teeth on the left premaxillary are erupting replacement teeth.

On the dentary there are 11 outer tricuspid teeth, those anteriorly display 4 cusps. There are 15–17 posterior conical teeth which pass medial to the outer row as far as the 8th outer tooth. There are 24 maxillary teeth. Both the upper and lower lips are papillate.

Colouration. There are indications of a dusky edge to the anal fin and of a bar across the dorsal fin. Humeral and caudal spots are faintly visible. Pigment is also present at the base of the caudal fin and along its posterior border.

Another specimen in the BMNH collection is identified as *Brycon bahiensis* (BMNH 1912.11.21 : 1, 157 mm SL, Porto Real, Rio Janeiro; Collected by Dreneuf). This fish has similar proportions to the type but differs in its dentition, possessing only 14 maxillary teeth, 8 outer dentary and 8 outer premaxillary teeth.

Table 4 Counts and proportional measurements for the holotype of *Brycon bahiensis* BMNH 1862.11.23 : 26.

SL (mm)	125		
D	30·4	Scales	8/43/5
S–D	53·5	Dorsal	ii 9
H	24·9	Anal	iv 21
Sn	32·0	Pectoral	I 13
IO	42·0	Ventral	I 7
Ey	29·0	Gill-rakers	12/13
Mth	32·0	Vertebrae	23 + 21
CpL	12·0	Supraneurals	10
CpD	9·5	Teeth:	
PL	20·0	Pmx 1	12
VL	16·7	2	8
AL	29·0	3	2
DL	17·6	Max	24
P–V	23·5	Dent	11/15/1
PP–V	80·5		

Brycon behreae Hildebrand, 1938

Brycon behreae Hildebrand, 1938, *Fieldiana Zool.* **22**: 278 (description and figure; type locality Rio Chiriqui basin and Rio Chagres basin, Panama); Thormählen de Gil, 1949, *Revta. Mus. La Plata* ns. **5**: 359 & 364 (reference, distribution); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Miller, 1966, *Copeia* (4): 785 (reference, distribution); Gery, 1977. *Characoids*: 339 (reference).

DISTRIBUTION. Pacific slope of western Panama.

COMMENTS. Specimens in BMNH collection: 1925.3.6 : 18–27. Rio Chirique del Tire, Pacific slope, Panama. Presented by Dr. Behre. (These had previously been identified as *Brycon striatulus*.)

Brycon bicolor Pellegrin, 1909

Brycon bicolor Pellegrin, 1909 *Bull. Mus. Hist. nat. Paris* **15** (1): 12 (description; type locality, Orinoco); Myers & Weitzman, 1960, *Stanford ichthyol. Bull.* 7 (4): 103 (reference); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. Orinoco.

COMMENTS. *Brycon bicolor* has not been recorded as being collected since Pellegrin's original description of 1909. I have examined the three syntypes of this species and find that it is a very characteristic taxon hardly to be confused with any other *Brycon* species.

The most characteristic feature of the species is the colour pattern on the caudal and anal fins (Fig. 8). A dark bar extends diagonally from the base of the caudal peduncle across the upper lobe of the caudal fin. Pigment on the anal fin begins from about the base of the 9th ray and increases to cover the remainder of the fin. In two of the specimens there is a light line extending from the base of the dorsal fin to the supraoccipital process; this may, however, be an artefact of preservation.

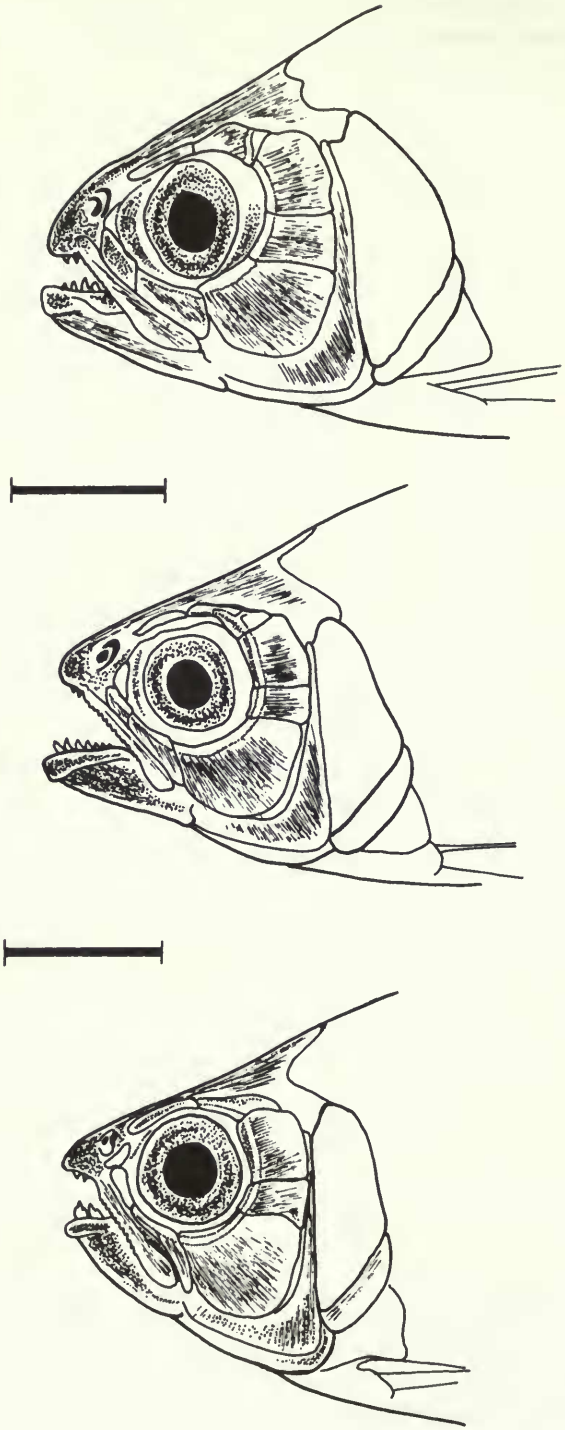


Fig. 5 (upper) *Brycon bahiensis*, head of holotype specimen BMNH 1862.11.23 : 26, 125 mm SL. **Fig. 6** (centre) *Brycon brevicauda*, head of syntype specimen BMNH 1849.4.8 : 42, 91 mm SL. **Fig. 7** (bottom) *Brycon falcatus* head of specimen BMNH 1972.10.17 : 1398–1411. Scales = 10 mm.

Table 5 Counts and proportional measurements for the syntypes of *Brycon bicolor* MNHN 87–746–748.

SL (mm) 111, 114·5, 118·5		
	Range	Mean
D	35·2–41·0	38·4
S–D	53·0–55·0	54·2
H	28·0–29·0	28·2
Sn	25·2–26·8	25·4
IO	40·0–44·5	41·5
Ey	26·2–30·0	28·8
Mth	25·0–39·0	37·0
CpL	9·2–10·8	10·2
CpD	10·9–11·3	10·7
PL	19·7–20·7	23·0
VL	16·5–17·8	17·0
AL	22·5–25·2	23·6
DL	22·2–25·1	23·3
P–V	23·5–25·8	25·0
PP–V	76·5–88·0	82·0
Scales	15/57–61/9	
Dorsal	ii 9	
Anal	iv 22 (f2), iv 23 (f1)	
Pectoral	i 13	
Ventral	i 7	
Gill-rakers	15/16, 14/14, 14/15	
Vertebrae	20 + 22	
Supraneurals	8	
Teeth:		
Pmx 1	8–10	
2	8–9	
3	2	
Max	24–27	
Dent	8–11/18–22/1	

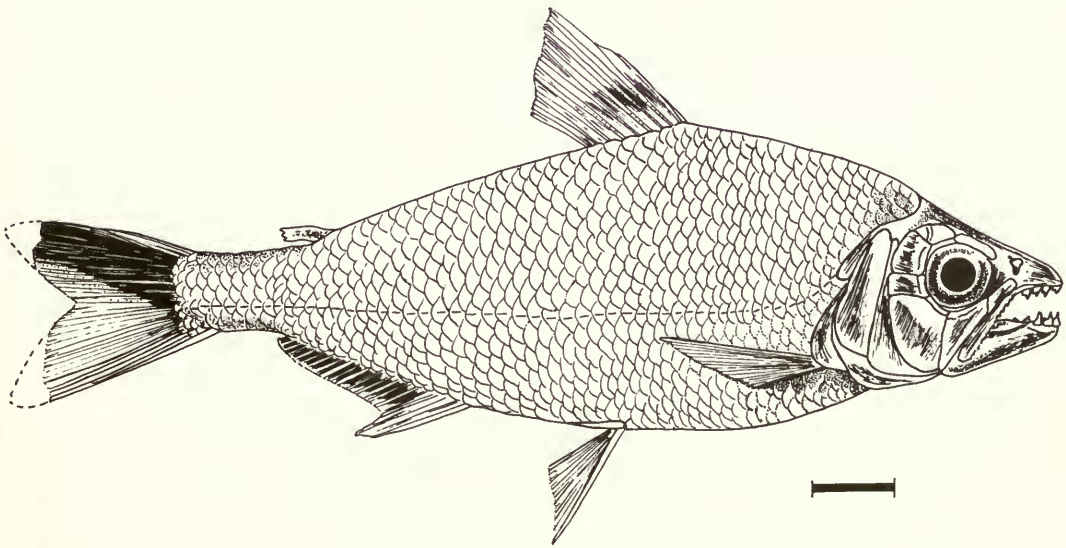


Fig. 8 *Brycon bicolor*, holotype MNHN 87746. Scale = 10 mm.

Other distinctive features are the large number of maxillary and inner dentary teeth (23–27 and 18–22 respectively) and the high number of scales between the dorsal fin and the lateral line (15).

Proportions and counts for the type specimens of *B. bicolor* are given in Table 5.

Brycon bolivarensis (Dahl) 1942

Synonym of *Brycon moorei moorei.*

Brycon brevicauda Günther, 1864

Brycon brevicauda Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 335 (description; type locality, Rio Tocantins, Rio Capin); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Boulenger, 1897, *Ann. Mag. nat. Hist.* (6) **20**: 297 (Marajo Island, specimen not in BMNH collections); Goeldi, 1898, *Boln. Mus. Paranense* **2**: 483 (Upper Tabajos); Fowler, 1950, *Archos Zool. Est. S. Paulo* **6**: 333 (reference and synonymy); Gery, 1964, *Vie et Milieu* (17): 448 (description, Ilha do Bananal, Brasil); Gery, 1977, *Characoids*: 338 (reference).

Brycon brevicaudus, Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference).

?*Brycon matrinchao* Fowler, 1941 (see p. 33).

DISTRIBUTION. Amazon, southern tributaries, R. Capin & R. Tapajos and Mato Grosso.

COMMENTS. The type specimens are a half-skin, 225 mm SL (270 mm total length), and two alcohol preserved specimens 91 & 87 mm SL, the head of the larger specimen is shown in Fig. 6.

The skin is still in a reasonable condition, except that the fin rays are somewhat broken and a few scales are missing. The jaws of the right side are present, but the teeth are badly damaged and an accurate count of those on the premaxilla is not possible.

The two alcohol specimens are well preserved and the colour patterns described by Günther are still present.

The skin is labelled as 'holotype'. This has not, however, been written by Günther and there seem to be no grounds for considering this specimen to be the holotype. The two other specimens are labelled as 'syntypes'. All the specimens appear to be conspecific.

Brycon brevicauda is a member of the *B. falcatus*-group (see p. 46) and indeed appears to 'replace' *B. falcatus* south of the Amazon. A comparison between the two species reveals differences in dentition and meristic characters. In *B. brevicauda* the teeth in the outer premaxillary row number 10–12 cf. 8–9 in *B. falcatus.* The dentary teeth are rather narrow and separated by a distinct gap from one another whereas in *B. falcatus* the teeth are stout and are contiguous. The lower jaw is also longer and shallower in *B. brevicauda* than in *B. falcatus.* Lateral line scales number 54–55 in *B. brevicauda* compared with 46–52 in *B. falcatus*, and mean body depth is 36·3% cf. 38% for the species respectively.

Both species share a similar type of colour pattern i.e. interrupted dark horizontal lines running through the middle of the scales along the dorsal and flanks; well-developed humeral spot (rather more elliptical in *B. brevicauda* than *B. falcatus*) and a black V-shaped caudal fin band. In addition both species possess the same kind of maxillary valve tissue pad and the same low number of vertebrae (total 40). Counts and proportions of the type specimen are given in Table 6. Specimens in BMNH collection:

Syntype	1842.4.20 : 13	Rio Jocantins	Pres. Gardiner
Syntypes	1849.4.8 : 42; 49	Rio Capin	Purch. Stevens (no doubt collected by Bates)

Brycon capito Cope, 1871

Brycon capito Cope, 1871, *Proc. Acad. nat. Sci. Philad.*: 261 (description; type locality, Rio Ambyiacu,

Table 6 Counts and proportional measurements of the syntypes of *Brycon brevicauda*.

BMNH 1864.4.20 : 13		BMNH 1849.4.8 : 42; 49	
SL (mm) 225	Half-skin	SL (mm) 91	87·5
D	37·5	36·0	35·5
S–D	49·0	51·5	52·5
H	21·0	29·5	28·5
Sn	–	29·5	28·0
IO	–	39·0	36·0
Ey	–	31·5	32·0
Mth	–	35·0	34·0
CpL	6·7	14·9	10·8
CpD	10·3	11·0	9·7
PL	17·7	19·7	19·4
VL	13·5	17·6	18·3
AL	25·0	25·4	24·0
DL	–	23·0	24·0
P–V	30·0	25·8	26·5
PP–V	61·0	74·0	76·5
Scales	10/55–56/?6	10/55/6	10/54/6
Dorsal	ii 9	ii 9	ii 9
Anal	iv 24	iv 24	iv 23
Pectoral	i 12	i 13	i 12
Ventral	i 7	i 7	i 7
Gill-rakers	–	12/14	14/14
Vertebrae	–	21 + 20	21 + 20
Supraneurals	–	8	8
Teeth:			
Pmx 1	–	11	12
2	–	9	9
3	2	2	2
Max	15	21	21
Dent	5/10/1	9/14/1	11/15/1

Ecuador); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 431 (reference); Fowler, 1906 (1907) *Proc. Acad. nat. Sci. Philad.* **58**: 446, fig. 42 (description of type); Eigenmann & Allen, 1942, *Fishes of Western South America*: 253 (reference); Fowler, 1942, *Boln. Mus. Hist. nat.* Javier Prado, (22–23): 372 (reference); Fowler, 1945. *Los Peces del Peru*: 149 (reference); Thormählen de Gil, 1949, *Revta Mus. La Plata* **5**: 364 (reference, distribution); Fowler, 1950, *Archos Zool. Est. S. Paulo* **6**: 334 (reference); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Upper Amazon.

COMMENTS. The type specimen would appear to be the only known example of this species. The type is stated by Fowler (1906) to be $2\frac{1}{4}$ inches long. His figure shows a fish with a very long head and with pectoral fins extending as far as the ventrals. The fish is obviously a juvenile, and possibly of a species already known from this region.

Brycon carpophagus (Valenciennes) 1849

Chalceus carpophagus Valenciennes in Cuvier & Valenciennes, 1849, *Hist. Nat. Poiss.* **22**: 252 (description, type locality, Essequibo; Amazon); Castelnau, 1855, *Exped. Amer. Sud., Poiss.* **2**: 68, pl. 34, fig. 3 (Rio Sabará, Minas Gereas). ?Kner, 1860, *Denkschr. Akad. Wiss. Wien* **18**: 12 (Irissanga, Rio Parana).

Brycon carpophagus, Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 336 (reference); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference): Fowler, 1950, *Archos Zool. Est. S. Paulo* **6**: 334 (reference). Schubert, 1962, *Atas Soc. Biol. Rio de J.* **6** (3): 27; Godoy, 1975, *Peixes do Brasil* **2**: 287 (description).
?*Salmo matrincham* Natterer in Kner, 1860, *Denkshr. Akad. Wiss. Wien* **18**: 12 (name included in synonymy).

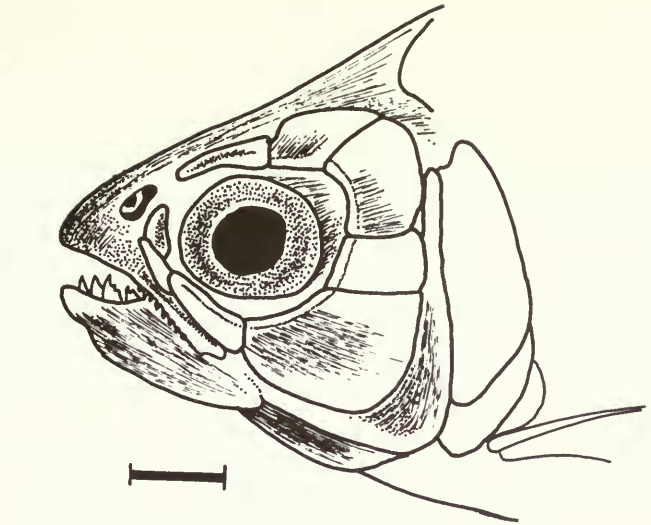
DISTRIBUTION. Amazon, Essequibo.

COMMENTS. I have examined two of the syntypes of *Brycon carpophagus* (proportions and measurements given in Table 7), namely those from the Essequibo and the Amazon, Schomburgk's (Fig. 9) and Montravel's specimens. Both specimens certainly appear to be conspecific and represent a taxon distinct from any other I have examined.

Lütken (1875) thought that *B. carpophagus* might prove to be the senior synonym of *B. orthotaenia* or *B. lundii*. *Brycon orthotaenia* is certainly not conspecific with *B. carpophagus*. As well as the evident differences in meristic and morphometric characters (cf. Tables 7 & 14) there are distinct differences in dental morphology, particularly in the premaxillary teeth (cf. Figs 10 & 22B). In *B. carpophagus* the tooth rows are more narrowly separated than those in *B. orthotaenia* and the teeth of the 3rd inner row are less strongly developed. There are differences also in the size and shape of the infraorbitals, and the

Table 7 Counts and proportional measurements for the syntypes of *Brycon carpophagus*.

MNHN A9832 Essequibo		MNHN A98 Amazon
SL (mm) 280		SL (mm) 255
D	34·0	29·7
S–D	53·0	50·0
H	24·0	25·6
Sn	30·0	29·0
IO	48·5	47·5
Ey	23·2	24·2
Mth	36·0	41·0
CpL	11·6	13·3
CpD	10·5	9·2
PL	18·7	Broken
VL	17·5	Broken
AL	23·0	23·0
DL	19·3	Broken
P–V	25·0	24·0
PP–V	75·0	–
Scales	12/58/9	12/58/8
Dorsal	ii 9	ii 9
Anal	iv 23	iv 24
Pectoral	i 15	i 14
Ventral	i 8	i 7
Gill-rakers	17/17	17/17
Vertebrae	22 + 25	21 + 26
Supraneurals	10	9
Teeth:		
Pmx 1	13	12
2	8	9
3	2	2
Max	22	21
Dent	10/19/1	11/13/1



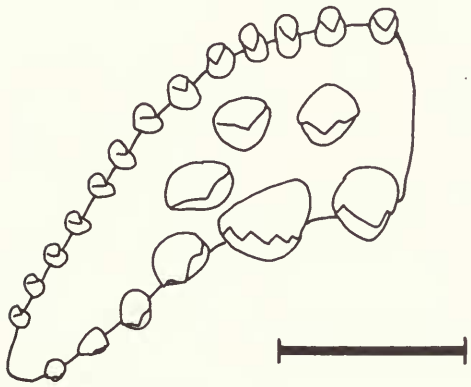


Fig. 9 (upper) *Brycon carpophagus*, head of syntype MNHN 9832. Scale = 10 mm. **Fig. 10** (lower) *Brycon carpophagus*, right premaxilla of syntype MNHN 9832. Scale = 5 mm.

border of the posterior cleithral lamina is extended caudad far more in *B. orthotaenia* than in *B. carpophagus*.

Brycon lundii is considered as possibly synonymous with *B. orthotaenia* (see p. 33).

The third syntype of *B. carpophagus* is a skin collected by Castlenau from the Rio Sabara (MHNH 81.25.3.2 A8615). However, from Castelnau's (1855) illustration (his description is only that of the coloration), and from an examination made on my behalf by Dr K. E. Banister, it is doubtful that the specimen is conspecific with the other two syntypes. From the illustration the scale counts are 9/51–52/?8 and prominent branching of the lateral line tubercles is shown, a feature which does not occur in the other syntypes. Banister (pers. comm) makes the scale count 11/50/6–7; the outer premaxillary teeth 8 (cf. 12–13 in the other syntypes) and those of the dentary 7/10 (cf. 10/19 in the other syntypes). These characters are more in accordance with *Brycon orthotaenia*.

Lütken (1875) notes that Natterer's specimen from Irisinga identified by Kner (1860) as *B. carpophagus* does not correspond with either Valenciennes or Castelnau's description of that species. The scale count given by Kner (1860) as 12/61/7 most closely matches that of *B. orbignyanus*.

Finally, the possibility remains that *B. carpophagus*, as represented by the Schomburgk and Montravel specimens, is a junior synonym of *B. amazonicus* known only from the iconotype (see p. 9).

Brycon cephalus (Günther) 1869

Megalobrycon cephalus Günther, 1869, *Proc. Zool. Soc. Lond.*: 423, fig. 1. (description, type locality, Upper Amazon); Regan, 1905, *Proc. Zool. Soc.*: 190 (Rio Negro; reference to a drawing by Wallace).

Brycon cephalus, Steindachner, 1876 (1877), *Sitz. Akad Wiss. Wien* **74** (9): 590 (synonymy of *Megalobrycon* with *Brycon*); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 56 (reference). Eigenmann, 1910. *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Eigenmann & Allen, 1942, *Fishes of Western South America*: 253 (reference); Fowler, 1942, *Boln. Mus. Hist. nat. Javier Prado* (22–23): 369 (reference); Fowler, 1945, *Los Peces del Peru*: 149 (reference); Thormählen de Gil, 1949, *Revta. Mus. La Plata* ns. **5** Zool.: 364 (reference, distribution); Fowler, 1950, *Archos Zool. Est. S. Paulo* **6**: 334 (reference); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Amazon.

COMMENTS. The type specimens are in a poor and fragile condition. There are virtually no scales left on the bodies and the fins are badly damaged. The cranial bones of one specimen (BMNH 1869.5.21 : 1) are exposed and partly disarticulated.

Counts and proportions for the types are listed below.

Apart from the types, the following specimens identified as *Brycon cephalus* have been examined:

BMNH 1893.4.24 : 37 Loc: Manaus, Coll. Antony (190 mm SL)
BMNH 1925.10.28 : 90 Loc: Manacapuni, Solimões. Coll. Erhardt (235 mm SL)
BMNH 1926.10.27 : 7 Loc: Monte Alegre, Amazon. Coll. Ternetz (180 mm SL)

The proportions and counts of these specimens conform to those of the types. The lateral line scale count ranges from 60–64. Günther, in his description of the types gives a count of *c.* 70, but I can count only approximately 58 scale pockets.

Günther (1869) distinguished his genus *Megalobrycon* from *Bryconops* but did not compare it with *Brycon*. This was presumably on the grounds that he thought there to be no inner row of mandibular teeth and thus it was immediately excluded from such a comparison. Steindachner (1876) pointed out that these specimens were probably aberrant in lacking the two inner teeth, and placed the species in the genus *Brycon*.

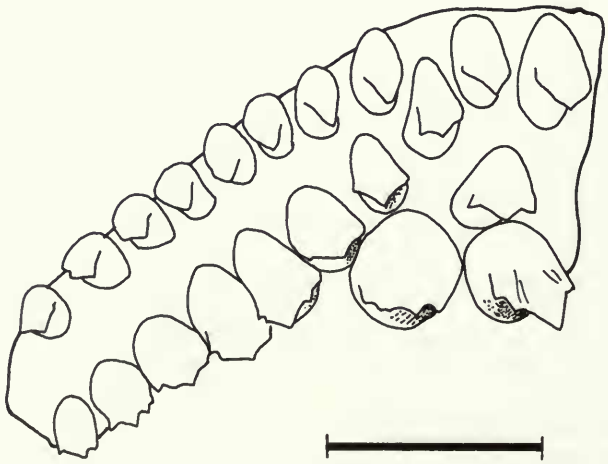


Fig. 11 *Brycon cephalus*, right premaxilla of syntype BMNH 1869.5.21 : 2, 305 mm SL. Scale = 5 mm.

In the larger specimen the two inner teeth are absent, but in the other they are present, although extremely small. These had obviously been overlooked by Günther. In the non-type specimens the inner teeth are very reduced as compared with those in other species. Premaxillary dentition resembles that of *B. falcatus* (Fig. 18).

Table 8 Counts and proportional measurements for the syntypes of *Brycon cephalus*.

	BMNH 1869.5.21 : 1	BMNH 1869.5.21 : 2
SL (mm)	287	305
D	31·5	29·5
S–D	51·0	50·0
H	24·0	24·5
Sn	29·0	30·5
IO	36·0	35·0
Ey	26·8	25·0
Mth	35·0	38·5
CpL	10·1	11·5
CpD	10·5	10·5
PL	broken	17·7
VL	broken	13·0
DL	broken	20·5
AL	22·4	25·3
P–V	24·0	24·0
PP–V	–	74·0
Scales	?13/58/?12	?
Dorsal	ii 9	ii 9
Anal	iv 22	iv 23
Pectoral	i 12	i 12
Ventral	i 7	i 7
Gill-rakers	10/14	15/16
Vertebrae	26 + 21	26 + 22
Supraneurals	10	9
Teeth:		
Pmx 1	10	10
2	8	9
3	2	2
Max	19	19
Dent.	12/6/1	9/11/0

Günther (1869) describes the colouration as appearing to be uniform, but in fact dark pigment still remains on the pectoral fins. Two of the non-type specimens display the colour pattern very well (Fig. 12). The posterior edges of the scales are dark, particularly at the overlapping edges, which gives the effect of zig-zag longitudinal lines. There is a dark humeral patch extending over 5 scales just above the lateral line. A dark band extends across the membrane of the dorsal fin; the pectoral fins are dusky, with a darker band extending across the middle of the fin; the ventral fins are dusky with a lighter edge but the tips of some rays are black. The membrane of the anal fin is very dark, becoming intensely black posteriorly. This darker region appears to extend along the scales at the base of the fin. The ventral surface of the caudal peduncle is black, this colouration extending as an oblique band to cover most of the peduncle and then continuing, still as an oblique band, across the upper lobe of the caudal fin. Some of the pigment runs onto the centre and lower rays of the fin.

The specimen figured by Goulding (1980, fig. 4.7) is undoubtedly *B. cephalus*.

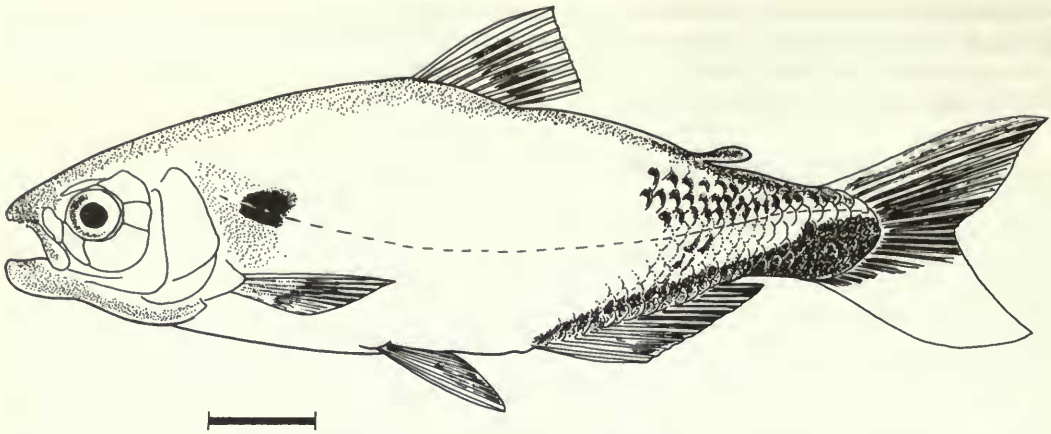


Fig. 12 *Brycon cephalus* (BMNH 1926. 10.27 : 7) showing characteristic body markings. Scale = 20 mm.

Brycon chagrensis (Kner & Steindachner) 1863)

Chalcinopsis chagrensis Kner & Steindachner in Kner, 1863, *Sber bayer Akad. Wiss. Munchen* **2**: 226 (description; type locality, 'Neu-Granada'); Kner & Steindachner, 1865, *Abh. bayer Akad. Wiss. Munchen* **10** (1): 42–43, pl. 5, fig. 3 (description; Rio Chagres); Wagner, 1865, *Abh. bayer Akad. Wiss. Munchen* **10** (1): 91 (reference to distribution); Regan, 1908, *Biologia Centrali Americana* Pisces: 169 (placed in synonymy of *B. striatulus*); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (placed in the synonymy of *B. striatulus*).

Chalcinopsis chagresensis (misspelling), Jordan & Evermann, 1896, *Bull. U.S. natn. Mus.* **47** (1): 337 (placed in the synonymy of *B. striatulus*).

Brycon chagrensis, Steindachner, 1876, *Sber. Akad. Wiss. Wien* **74** (1): 590 (synonymised with *B. striatulus*); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 55 (reference); Meek & Hildebrand, 1916, *Fieldiana Zool.* **10**: 295 (description; Chagres basin); Eigenmann, 1922, *Mem. Carnegie Mus.* **9** (1): 139 (description; Chagres basin); Behre, 1928, *Ann. Carnegie Mus.* **18**: 317 (placed in synonymy of *B. striatulus*); Hildebrand, 1938, *Fieldiana Zool.* **22**: 276 (discussion of the distinctness of *B. striatulus* and *B. chagrensis* with a note on distribution); Thormählen de Gil, 1949, *Revta Mus. La Plata* **5** Zool.: 359 & 364 (reference and note on distribution); Hubbs, 1953, *Copeia* (3): 143 (note on authorship); Miller, 1966, *Copeia* (4): 785 (reference, distribution); Menezes, 1969, *Papéis Dep. Zool. S. Paulo* **22** (20): 218–220 (notes on food); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Central Panama, Atlantic slope.

Brycon coquenani Steindachner, 1917

Brycon coquenani Steindachner, 1917, *Denkschr. Akad. Wiss Wien* **93**: 37, pl. 1, figs 1 & 2 (description; type locality, Rio Coquenan, Venezuela); Schultz, 1944, *Proc. U.S. natn. Mus.* **95**: 307 (description in key); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* **7** (4): 103 (reference); Gery, 1977, *Characoids*: 342 (reference in key).

DISTRIBUTION. Rio Coquenan, Venezuela.

Brycon coxeyi Fowler, 1943

Brycon coxeyi Fowler, 1943, *Notul. nat.* (119): 3, fig. 2 (description; type locality, Hacienda Los Mascota on Rio Pastaza, Rio Marañon basin, Ecuador, Amazon drainage); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 334, fig. 391 (reference); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* **7** (4): 103 (reference); Ovchynnyk, 1968, *Zool. Anz.* **181** (3–4): 245 (reference); Gery, 1977, *Characoids*: 342 (reference in key).

DISTRIBUTION. Rio Pastaza, Upper Amazon.

COMMENTS. Possibly synonymous with *B. melanopterus*.

Brycon dentex Günther, 1860

Brycon dentex Günther, 1860, *Proc. Zool. Soc. Lond.*: 240 (description; type locality, Esmeraldas, Ecuador); Eigemann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 55 (reference); Boulenger, 1898, *Boll. Musei Zool. Anat. comp. R. Univ. Torino* **13**: 329 (Rio Peripa); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Eigenmann, 1922, *Mem. Carnegie Mus.* **9** (1): 134, pl. 22, fig. 1 (synonymy, description; Rio Daule, Guayaquil); Rendahl, 1937, *Ark. Zool.* **29A** (11): 6 (Rio de Clementina, Ecuador); Böhlke, 1958, *Proc. Acad. nat. Sci. Philad.* **110**: 70 (measurements tabulated and discussion); Ovchynnyk, 1961, *Zool. Anz.* **181** (3–4): 245 (reference, Ecuadorian localities); Gilbert & Roberts, 1971, *Preliminary survey of the freshwater food fishes of Ecuador*: 26 (reference); Gery, 1977, *Characoids*: 339 (reference in key).
Chalcinopsis dentex (part), Günther 1864, *Cat. Fish Brit. Mus.* **5**: 337 (description, Esmeraldas).

DISTRIBUTION. Ecuador, Pacific drainage.

COMMENTS. *Brycon dentex* is a distinctive species characterized by a long snout which projects well beyond the lower jaw (Fig. 13), leaving nearly all the upper jaw teeth exposed. The outer row teeth are not covered by the lip. The premaxillary has a wide dentigerous surface with the teeth arranged in four rows. The premaxillary symphysial joint is weakly

Table 9 Counts and proportional measurements for the syntypes of *Brycon dentex* BMHN 1860.6.16 : 156–159.

SL (mm) 116, 128·5, 148·2, 198·5		
	Range	Mean
D	31·0–33·5	32·2
S–D	51·5–56·0	53·6
H	23·2–24·0	23·9
Sn	31·5–28·2	28·6
IO	31·5–37·0	34·6
Ey	27·0–30·5	29·1
Mth	24·9–28·5	26·7
CpL	11·5–13·4	12·7
CpD	8·5–9·0	8·7
PL	19·7–20·0	19·8
VL	13·7–15·6	14·7
AL	31·0–34·0	32·1
DL	19·0–19·8 (f3)	19·5
P–V	20·5–24·5	22·7
PP–V	83·0–96·0	87·0
Scales	10/47–51/8	
Dorsal	ii 9	
Anal	iv 31 (f3), iv 32 (f1)	
Pectoral	i 11 (f1), i 12 (f3)	
Ventral	i 7	
Gill-rakers	23/23–24	
Vertebrae	23 + 23 (f1), 23 + 24 (f1), 24 + 23 (f2)	
Supraneurals	10 (f1), 11 (f3)	
Teeth:		
Pmx 1	8–9	
2	8–9	
3	8	
4	2	
Max	9 (f1), 11 (f1), 15 (f2)	
Dent.	6–8/7–10/1	

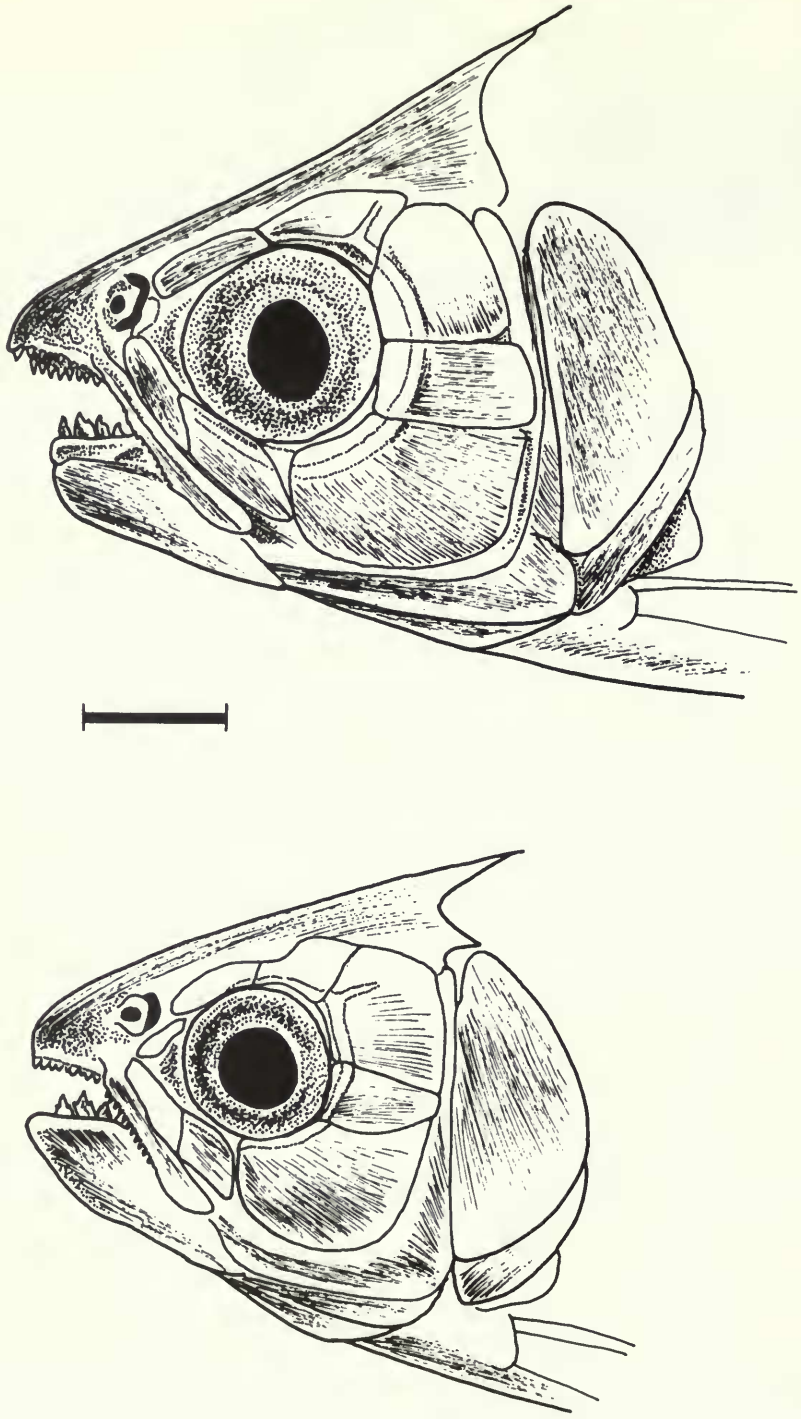
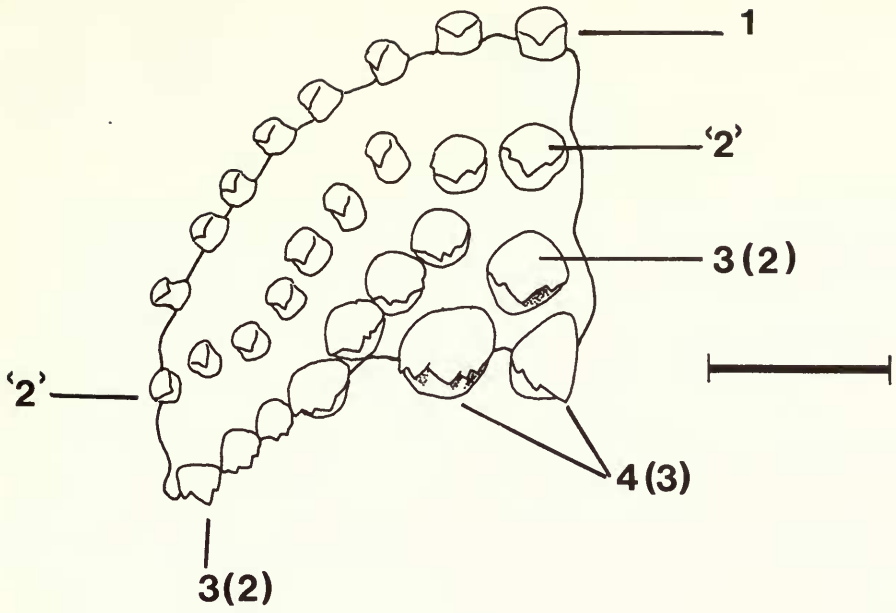


Fig. 13 (upper) *Brycon dentex*, head of syntype BMNH 1860.6.16 : 156, 198·5 mm SL. **Fig. 14** (lower) *Brycon oligolepis*, head of syntype BMNH 1914.5.18 : 5. 157 mm SL. Scale = 10 mm.



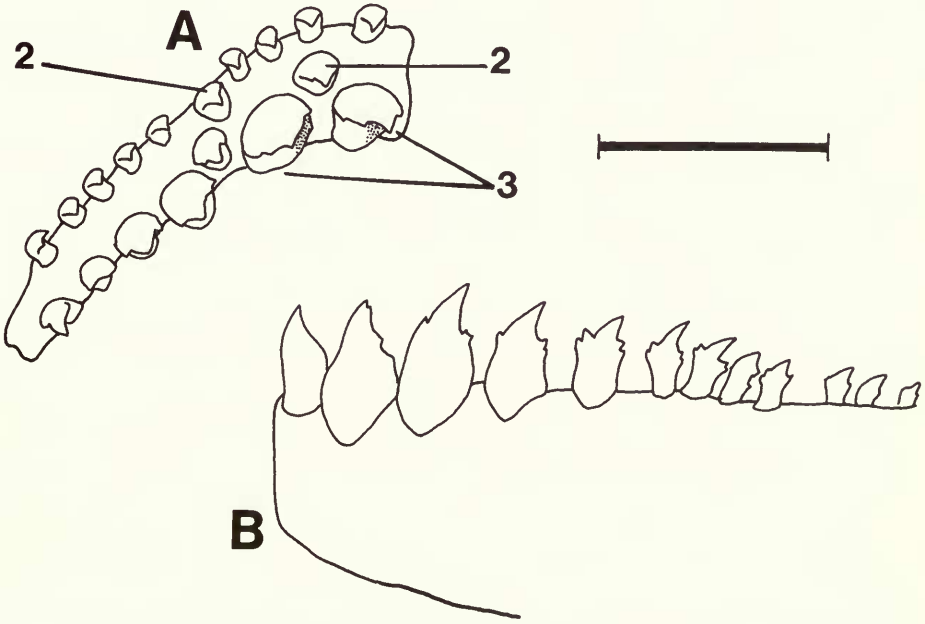


Fig. 15 (upper) *Brycon dentex*, right premaxilla. 1 = 1st, outer row; '2' refers to what is descriptively accepted as the 2nd row, but which ontogenetically is an almagamation of 1st and 2nd row teeth; 3(2) indicates the descriptive 3rd row but which ontogenetically is the 2nd row, and 4(3) refers to the descriptive 4th but ontogenetic 3rd row. **Fig. 16** (lower) *Brycon devillei* A, right premaxilla of syntype MNHN 4517; B, anterior part of left dentary in lateral view. Scale = 5 mm.

developed. Böhlke (1958) stresses that the 'Esmeraldas portion of the type series of *B. dentex* should be compared with the "Western Ecuadorian" specimens of *B. oligolepis* Regan'. In fact all the specimens constituting the type series are from the Esmeraldas. *Brycon dentex* differs from *B. oligolepis* in the arrangement of its teeth (cf. Figs 15 & 21) and in the number of lateral line scales and anal fin rays (cf. Tables 9 & 13). Specimens in the BMNH collections:

1860.6.16 : 156–159 (Syntypes)	Esmeraldas	Pres. Fraser
1976.7.5 : 20	Rio Jubones, near Pasaje	Coll: Bray
1978.7.14 : 18–19	Azuay region, south Ecuador	Coll: Lownie

Brycon devillei (Castelnau) 1855

Chalceus devillei Castelnau 1855, *Exped. Amer. Sud. Poiss.* **2**: 69, pl. 36, fig. 2 (description; type locality, Bahia); Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 333 (reference); Steindachner, 1879, *Denkschr. Akad. Wiss. Wien* **41** (1): 50 (*B. insignis* included in synonymy).

Brycon devillei, Eigenmann & Eigenmann 1891, *Proc. U.S. natn. Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Amaral-Campos, 1950, *Papéis Dep. Zool. S. Paulo* **9** (10): 140 (Rio Doce); Fowler, 1950, *Archos Est. Zool. S. Paulo* **6**: 335 (reference); Gery, 1977, *Characoids*: 339 (reference in key).

?*Brycon insignis* Steindachner, 1876, *Sber. bayer Akad. Wiss. Wien* **74** (1): 587; Thormählen de Gil, 1949, *Revta Mus. La Plata* ns. **5** Zool.: 360 (reference).

DISTRIBUTION. Bahia, ?Jequitinhonha, ?R. Doce.

COMMENTS. I have examined the holotype of *Brycon devillei* and find this to represent a very distinctive taxon (Fig. 1). The most characteristic features are the length of the jaws and the nature of the dentition. The number of maxillary teeth are the highest for any *Brycon* species (30) and the 2nd row of premaxillary teeth is only narrowly separated from the outer row. The small teeth in the dentary occurring posterior and medial to the outer row number up to 37, again, the highest of any *Brycon* species.

The outer row premaxillary teeth have the central cusp strongly elongate and recurved (Fig. 16). The teeth of the second row are tri- to quadricuspid. Those in the 3rd row are quinqicuspid with the median cusp well-developed. The outer dentary teeth are quadricuspid with the 2nd cusp strongly triangular and recurved. The small medial dentary teeth extend as far forward as the 3rd outer tooth. The inner pair of symphysial teeth are strongly recurved unicuspids.

Many of the scales on the flanks are lost and little colour is present on the body save for a slightly darker dorsum. The dorsal fin is strongly pigmented between the 3rd and 6th rays; the anal fin bears a dark middle band extending posteriorly to the 19th ray; the bases of the upper and lower lobes of the caudal fin are dark and pigment extends along the principal rays of both lobes; both the pectoral and ventral fins are pigmented at their edges.

The general condition of the holotype is good and apart from the loss of scales the only damage is to the upper lobe of the caudal fin, which is missing (Fig. 17).

In overall appearance and dental morphology *B. devillei* most closely resembles *B. acuminatus* and *B. reinhardti*.

Concerning *Brycon insignis*, a direct comparison between Steindachner's (1876) figure and the type of *B. devillei* indicate that they are similar but that the 4th infraorbital of *B. insignis* is narrower than that of *B. devillei*, and that there are more branched anal fin rays (26 cf. 23).

If the taxa described by Steindachner (1876) and Amaral-Campos (1950) are conspecific with *B. devillei* then the distribution of this species is from Bahia to the Rio Jequitinhonha and south to the Rio Doce.

Counts and proportions for the holotype of *B. devillei* are given in Table 10.

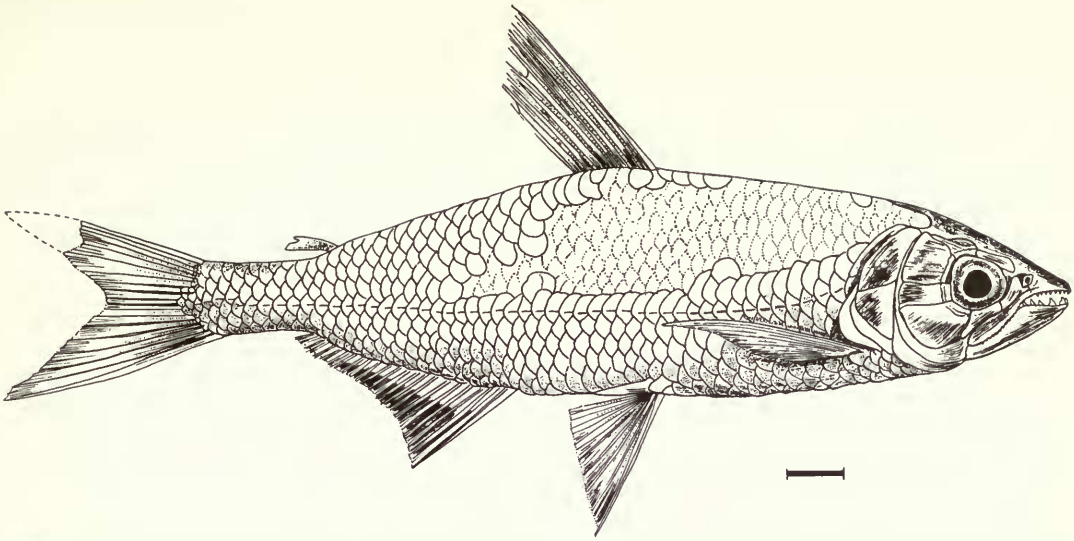


Fig. 17 *Brycon devillei*, syntype MNHN 4517. Scale = 20 mm. The dashed scale margins indicate those scales that are missing.

Table 10 Counts and proportional measurements for a syntype of *Brycon devillei* MNHN 4517, SL (mm) 143.

D	28·0	Scales	12/48/6
S–D	56·5	Dorsal	ii 9
H	28·0	Anal	iv 23
Sn	27·5	Pectoral	i 14
IO	31·2	Ventral	i 7
Ey	26·1	Gill-rakers	13/14
CpL	9·8	Vertebrae	20 + 24
CpD	9·2	Supraneurals	10
PL	22·0	Teeth:	
VL	17·5	Pmx 1	8–9
AL	27·0	2	6–7
DL	24·0	3	2
P–V	20·0	Max	25 (left) 30 (right)
PP–V	110·0	Dent	14–15/35–37/1

Brycon ecuadoriensis Eigenmann & Henn, 1917

Considered to be conspecific with *B. atrocaudatus* by Böhlke (1958: 62–63), but probably a distinct species. See comments on p. 10.

Brycon erythropterum (Cope) 1871

Megalobrycon erythropterum Cope, 1871 (1872), *Proc. Acad. nat. Sci. Philad.* **23**: 263 (description; type locality Rio Ambyiacu).

Megalobrycon erythropterus, Cope, 1871 (1872) *op. cit.* pl. 10, fig. 2.

Brycon erythropterus, Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Gery, 1977, *Characoids*: 335 (?synonym of *B. cephalus*).

Brycon erythropterum, Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 56 (reference); Fowler, 1939, *Proc. Acad. nat. Sci. Philad.* **91**: 263 (Contamana, Peru); Eigenmann & Allen, 1942, *Fishes of Western South America*: 254 (list of Peruvian localities): Fowler, 1942, *Boln. Mus. Hist.*

nat. Javier Prado (22–23): 170 (Peru); Fowler, 1945, *Los Peces del Peru*: 149 (reference); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 335 (reference).

DISTRIBUTION. Rio Ambyiacu, eastern Ecuador (Amazon drainage).

COMMENTS. Cope (1871) separated this species from *B. melanopterum* on the basis of colour pattern, position of dorsal fin, number of anal rays and differences in dentition. The differences as given by Cope appear to be those within the range of variability for a single species and it may eventually prove that both *B. erythropterum* and *B. melanopterum* are conspecific. Gery (1977), considered—probably correctly—that *B. erythropterum* may be a synonym of *B. cephalus*.

Brycon erythrura Fowler, 1941

Brycon erythrura Fowler, 1941, *Proc. Acad. nat. Sci. Philad.* **93**: 191, fig. 101 (description; type locality, Rio Jaguaribe, Oros, Russas); Thormählen de Gil, 1949, *Revta Mus. La Plata,* ns. **5** Zool.: 359 & 364 (reference and distribution); Fowler, 1950, *Archos Esta Zool. S. Paulo,* **6**: 335, fig. 392 (reference); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference and comment). Gery, 1977, *Characoids*: 651 (reference in index).

DISTRIBUTION. Rio Jaguaribe, Ceara, S.E. Brazil.

COMMENTS. As noted by Myers & Weitzman (1960) this species appears, at least from the figure, to be a *Salminus*. However, the description of the dentition and of the gill-rakers does not quite agreee with that of any species of *Salminus*. Gery (1977) refers this species to *Salminus hilarii.* This must remain a *species inquirenda.*

Brycon falcatus Müller & Troschel, 1844

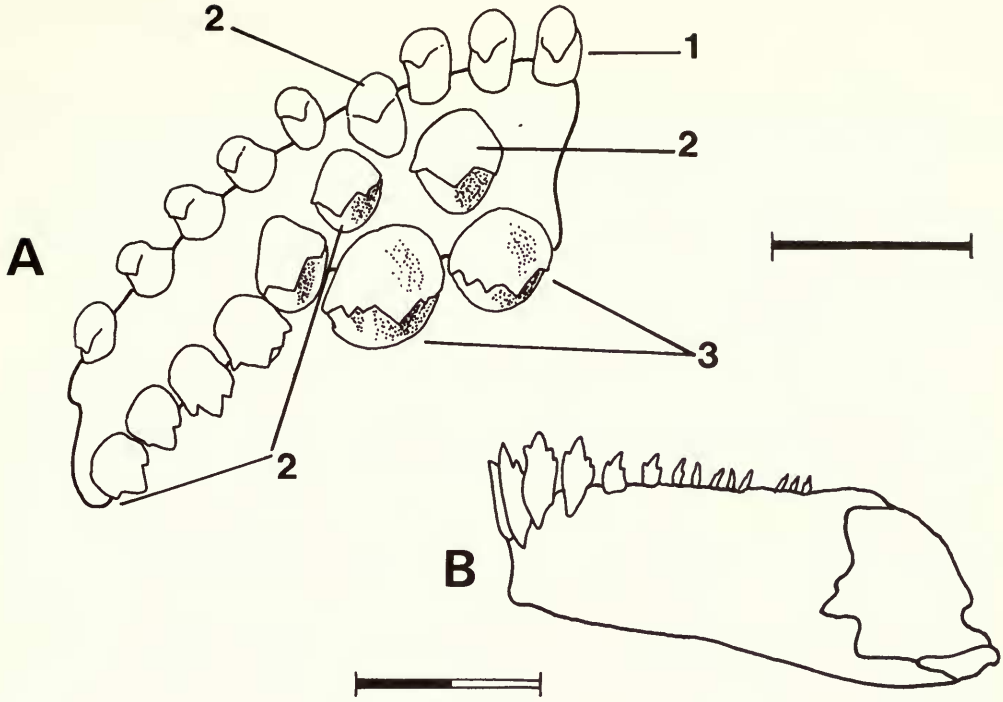
?*Chalceus labrosus* Schomburk, 1841, *Fish Brit. Guiana* **1**: 212.

Brycon falcatus Müller & Troschel, 1844, *Arch. Naturgesch* (1): 90 (brief description; type locality, Guiana; Surinam); Müller & Troschel, 1845, *Horae Ichth.* (1–2): 29, pl. 6, fig. 1 (description; Rivers of British Guiana and Surinam); Müller & Troschel, 1848 in Schomburgk, *Reisen in British-Guiana* **3**: 635; Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 334 (Essequibo; Surinam); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Goeldi, 1898, *Boln. Mus. Paranense* **2**: 483 (Capim); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 431 (reference); Eigenmann, 1912, *Mem. Carnegie Mus.* **5**: 371, pl. 54, fig. 2 (synonymy, description, Guiana localities); Steindachner, 1917, *Denkschr. Akad. Wiss. Wien* **93**: 36 (Rio Surumu, Rio Branco); ? Nakashima, 1941, *Boln. Mus. Hist. nat. Javier Prado* ano 5 **16**: 70 (Iquitos); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 335 (reference); Thormählen de Gil, 1949, *Revta Mus La Plata,* ns. Zool. **5**: 360 (reference); Gery, 1964, *Vie et Milieu* (17): 450 (reference in key); Gilbert & Roberts, 1971, *Preliminary survey of the freshwater food fishes of Ecuador*: 26 (Amazon drainage); Gery, 1977, *Characoids*: 338 (reference in key).

Brycon schomburgki Müller & Troschel, 1844, *Arch. Naturgesch* (1): 91 (description; Guiana); Müller & Troschel, 1845, *Horae Ichth.* **1**: 29, pl. 6, fig. 2 (description; type locality, Essequibo); Müller & Troschel, 1848 in Schomburgk, *Reisen in British-Guiana* **3**: 96 (lower Essequibo); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Eigenmann, 1912, *Mem. Carnegie Mus.* **5**: 371 (included in synonymy of *B. falcatus*).

DISTRIBUTION. Amazon; Guyana; Surinam.

COMMENTS. In their original description Müller & Troschel (1844) did not designate type specimens, the locality was simply stated as 'Hab. in Guiana et Surinam'. In 1845 the authors made a full description stating a measurement of 9 zoll which would appear to be applicable to the specimen illustrated in plate 6. The specimens deposited in Berlin were those collected by Schomburgk (Essequibo) and Diepering (Surinam) and it would appear that these were the only specimens used for the description. Günther (1864) notes that Schomburgk's specimens in the BMNH are the types of the species. However, there is no evidence to support this and it would appear that the type specimens are those in Berlin.



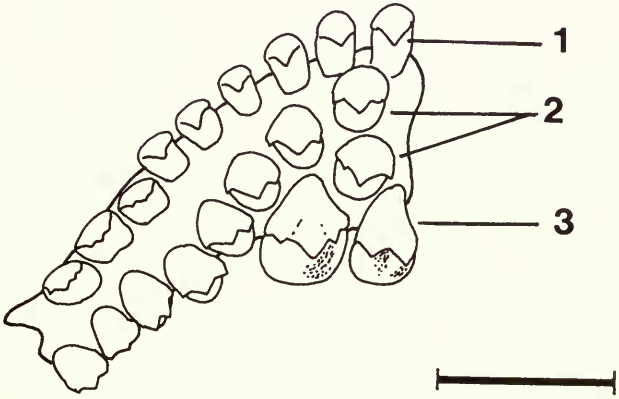


Fig. 18 (upper) *Brycon falcatus* A, occlusal view of right premaxilla. Scale = 3 mm; B, lateral view of left dentary. Scale = 10 mm. **Fig. 19** (lower) *Brycon guatemalensis*, occlusal view of right premaxilla. The 'misplaced' medial symphysial tooth is reckoned as belonging to the 2nd row (cf. Fig. 15). Scale = 5 mm.

Ontogenetic change is apparent in overall body proportions. Juveniles (less than 50 mm SL) are shallow bodied with a somewhat concave profile over the head. Larger specimens are deep bodied with a distinctly convex profile (Fig. 7). Premaxillary teeth are characteristically massive (Fig. 18).

Examination of stomach contents (pers. obs) show this species to be completely omnivorous. Contents include plant remains (stems and seeds); insects, (Coleoptera and Hymenoptera) and fish (catfish spines, possibly pimelodontid, and characoids, *Bryconops* sp.).

Brycon falcatus is recorded from the Amazon and Guianas. It apparently occurs in the Upper Amazon (Gilbert & Roberts, 1971) but the record from Iquitos of Nakashima (1941) must be regarded as dubious as this author gives a lateral line scale count of 68 (cf. 46–52 in specimens listed below).

Specimens in the BMNH collection:

1969.12.12 : 1–3 (previously unregistered)	British Guiana	Pres. Schomburgk
1864.1.21 : 35–36	Essequibo River, British Guiana	Pres. Erhardt
1870.3.10 : 28	Surinam	Pres. Kappler
1866.9.10 : 20	Surinam	Pres. Kappler
1866.9.10 : 23	Surinam	Pres. Kappler
1864.10.3 : 6	British Guiana	
1911.10.31 : 350	Turkeit, British Guiana	Pres. Eigenmann
1934.9.12 : 321–32	Upper Cuyuni, British Guiana	Pres. Carter
1972.7.27 : 52–76	Rupununi District, Guyana	Pres. Lowe-McConnell
1972.10.17 : 1398–1411	Moraballi, Essequibo, Guyana	Pres. Liley
1981.6.9 : 1–6	Nickerie district, Surinam	Pres. U.S. Natn. Museum

Brycon ferox Steindachner, 1876

Brycon ferox Steindachner, 1876, *Sber Akad. Wiss Wien.* **74**: 538, pl. 4, figs 1 & 1a (description; type locality, Rio Mucuri); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Thormãhlen de Gil, 1949, *Revta Mus. La Plata* ns. **5** Zool.: 360 (reference); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 337 (reference); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Rio Mucuri.

COMMENTS. From Steindachner's description and figures *Brycon ferox* appears to be closely related to, if not conspecific with *B. acuminatus*. Scale and fin ray counts match, as does the colour pattern. The elongate central cusps of the lower teeth shown in Steindachner's (1876) fig. 1a also closely resemble the tooth form of *B. acuminatus*. Steindachner (1876) points out the absence in one specimen of the two inner symphysial lower jaw teeth and it is presumably that specimen which he illustrates. Until such time as the holotypes of *Brycon ferox* and *B. acuminatus* can be compared directly then I retain both as separate taxa.

Brycon fowleri Dahl, 1955

Brycon fowleri Dahl, 1955, *Revista Linneana* **1**: 11–19; Myers & Weitzman, 1960, *Stanford Ichthyol. Bull* 7 (4): 103 (reference); Dahl, 1971, *Los Peces del Norte de Colombia*: 125, fig'd. (description).

DISTRIBUTION. Rio Sinu, Colombia (Caribbean slope).

COMMENTS. Original description of this species not seen. Dahl (1971) says that the species is endemic to the Rio Sinu. From the illustration the fish appears very like *B. oligolepis* but seems to possess a very short based dorsal fin.

Brycon guatemalensis Regan, 1908

Brycon guatemalensis Regan, 1908, *Biologia Centrali Americana,* Pisces: 168 (description; type localities, Rio Chisoy, R. Usumacinta, R. Motagua, Lake Yzabel, Guatemala); Meek, 1914, *Fieldiana Zool.* **10** (10): 108 (Costa Rican localities); Eigenmann, 1922, *Mem. Carnegie Mus.* **9**: 130 & 134 (reference and in key); Fowler, 1923, *Proc. Acad. nat. Sci. Philad.* **75**: 26 (description; Eden and Upper Tunky, Atlantic coast of Nicaragua); Hildebrand, 1938, *Fieldiana Zool.* **22** (4): 281 (description, distribution); Carr & Giovannoli, 1950, *Occ. Pap. Mus. Zool. Univ. Mich.* **523**: 10–11 (Rio Choluteca and tributaries, Honduras); Miller, 1966, *Copeia* (4): 785 (reference; distribution); Bussing, 1966 (1967), *Revta Biol. Trop.* **14** (2): 236 (reference; Costa Rica); Alvarez del Villar, 1970, *Peces Mexicanus*: 46 (description contained in key); Astorqui, 1971, *Revta Biol. Trop.* **19** (1–2): 27 Lake Nicaragua); Gery, 1971, *Aquarium* **4** (7): 49–50 (Punta Gorda, British Honduras); Bussing, 1976, in *Investigations of the Ichthyofauna of Nicaraguan Lakes* ed. Thorson T. B. Univ. of Nebraska: 160–161 (distribution); Gery, 1977, *Characoids*: 335, 339 (reference).

Chalcinopsis dentex (part), Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 337; Günther, 1868, *Trans. Zool. Soc. Lond.* **6**: 478 (Guatemalen specimens); Gill & Bransford, 1877, *Proc. Acad. nat. Sci. Philad.* **29**: 188 (description; Lake Nicaragua).

Brycon dentex (non Günther, 1860), Jordan & Evermann, 1896, *Bull. U.S. natn Mus.* **47** (1): 337 ('Yucatan to Ecuador'); Eigenmann & Ogle, 1907, *Proc. U.S. natn. Mus.* **33** (1556): 30 (Nicaragua); Meek, 1907, *Fieldiana Zool.* **7** (4): 109 (description; Lake Nicaragua).

DISTRIBUTION. Mexico, Guatemala, Honduras, Costa Rica, ?Nicaragua.

COMMENTS. This species is characterized by an almost straight dorsal profile. The pectoral, ventral and anal fin rays of two specimens (♂♂) bear denticulate protuberances. I have not found this feature in any other *Brycon* species examined (but see Kramer, 1978, cited under *B. petrosus*). The papillate lips are extremely well-developed.

The counts and proportions for the type specimens are listed in Table 11; all appear to be conspecific.

The species is reported as having a wide distribution, from Mexico to Guatemala (Miller, 1966). Jordan & Evermann (1896) give the range as from Yucatan to Ecuador but I have been unable to trace a reference to this species' occurrence in Yucatan. Regan (1908) noted that *B. guatemalensis* recorded from Lake Nicaragua by Gill and Bransford (1877) and Meek (1907), cited in those papers as *Brycon dentex*, was probably distinct from *B. guatemalensis*. Fowler (1923) thought there were no differences between his specimens from the Atlantic slope of Nicaragua, and those from Guatemala. Astorqui (1971) examined material from Lake Nicaragua but compared this only with the descriptions of Günther and Regan, and incorrectly synonymised *Brycon dentex* Günther 1860 (the Ecuadorian species) with *B. guatemalensis*. Regrettably I have no specimens available from Lake Nicaragua and am thus unable to confirm the opinion of Regan (1908) on the distinctiveness of the Nicaraguan taxon.

I have examined specimens determined as *B. guatemalensis* from Guarumo on the Atlantic slope of Panama collected by Dr. Behre. Hildebrand (1938, p. 281) states that he had not seen any of Behre's Panamanian specimens but on the basis of anal fin ray and scale counts considered them to belong to *B. guatemalensis*. The two specimens examined differ from the types in possessing slender bodies, M = 25·9% of SL cf. 31%; sloped dorsal profile cf. straight in *B. guatemalensis*; short caudal peduncle, M = 8·4% cf. 9·4%; shorter pectoral fin, M = 18·4% cf. 22·2%, and shorter anal fin, 25·1% cf. 31·2%. There are 8 scales above and 6 below the lateral line, cf. 10/8 in *B. guatemalensis*. The Panamanian specimens also exhibit a different preserved coloration in which the back is very dark, as are the pectoral fins. The type and arrangement of the dentition is almost identical in the two taxa (Fig. 19).

Behre (1928) also noted that his specimens differed from Regan's and quotes Eigenmann (a reference which I am unable to trace) to the effect that *B. argenteus* is identical with *B.*

guatemalensis. Hildebrand (1938) has shown that this is not the case. I have no specimens of *Brycon argenteus* to hand and am unable to say with certainty whether or not Behre's '*guatemalensis*' is conspecific with *B. argenteus*. Using Hildebrand's keys (1938, and in Eigenmann, 1922) these specimens do not key out satisfactorily to any of the Central American species but appear closer to *B. argenteus* than to any other species.

I would consider that this Atlantic slope form is not *Brycon guatemalensis* or *B. argenteus* and that it possibly represents a new species. However, only more extensive collections will resolve this problem and that concerning possible difference between lacustrine and fluviatile *B. guatemalensis*.

In Tables 11–12 the ranges are shown for the syntypical series from Rio Motagua, and individual proportions for those from the other type localities. The calculated means for the entire type series are compared with those of the two specimens from the Atlantic slope of Panama.

Brycon henni Eigenmann, 1913

Brycon henni Eigenmann, 1913, *Indiana Univ. Stud.* **18**: 36 (description; type locality, Upper Cauca and Dagua); Eigenmann, 1922, *Mem. Carnegie Mus.* **9**: 135, pl 22, fig. 2 (description; Colombian localities); Miles, 1947, *Los Peces del Rio Magdalena*: 160, fig. 114 (description; distribution); Myers

Table 11 Counts and proportional measurements for the syntypes of *Brycon guatemalensis*.

BMNH 1864.1.26 : 226–9 Rio Motagua		1864.1.26 : 387 Lake Yzabel	1869.2.23 : 8 Rio Chisoy	1865.4.29 : 40 R. Usumacinta
SL (mm) 214, 275, 341		72·5	177	231
	Range			
D	31·3–33·5	29·0	30·0	29·5
S–D	53·5–55·0	53·0	52·5	53·5
H	23·0–24·2	24·8	24·9	24·8
Sn	23·6–30·9	27·8	29·5	30·0
IO	38·0–46·0	27·8	34·0	40·5
Ey	22·0–25·0	33·3	25·0	24·5
Mth	27·0–32·0	27·8	29·5	30·0
CpL	11·3–11·7	12·4	11·9	10·8
CpD	9·5–9·8	9·6	9·1	9·1
PL	22·0–22·5	20·6	19·2	20·8
VL	15·5–16·7	15·3	13·5	16·0
AL	28·5–33·0	27·6	27·0	30·0
DL	18·4–20·9	20·0	18·0	19·0
P–V	21·0–24·0	19·4	25·0	26·0
PP–V	93·0–109·0	107·0	77·0	80·0
Scales	10/54/8	10/59/8	10/55/8	9/55/8
Dorsal	ii 9	ii 8	ii 9	ii 9
Anal	iv 30 (f1), iv 32 (f2)	iv 31	iv 30	iv 30
Pectoral	i 12 (f2), i 13 (f1)	i 12	i 12	i 12
Ventral	i 7	i 7	i 7	i 7
Gill-rakers	12/14, 14/15, 13/14	11/16	14/15	12/15
Vertebrae	23 + 22	23 + 22	23 + 22	24 + 22
Supraneurals	10 (f1), 11 (f2)	10	10	10
Teeth:				
Pmx 1	7–9	8	9	8
2	7–10	8	8	8
3	2	2	2	2
Max	13 (f1), 15 (f2)	11	15	13
Dent	8–11/8–9/1	7/8/1	9/7/1	9/10/1

Table 12 Comparison of the means for proportional measurements between all syntypes of *Brycon guatemalensis* and two specimens from Garurno, Panama.

B. guatemalensis mean of all syntypes		*Brycon 'guatemalensis'* Garurno, Panama BMNH 1925.3.6 : 16–17
		SL (mm) 215, 125
D	31·0	25·9
S–D	53·5	53·2
H	24·2	24·8
Sn	26·3	30·5
IO	37·8	34·5
Ey	25·3	25·8
Mth	29·4	26·2
CpL	11·5	12·4
CpD	9·4	8·2
PL	21·1	18·4
VL	15·5	14·2
AL	29·5	25·1
DL	19·2	18·1
P–V	22·9	21·8
PP–V	93·9	77·2
Scales	10/55/8	8/55/6
Dorsal	ii 9	ii 9
Anal	iv 30	iv 31
Pectoral	i 12	i 12
Ventral	i 7	i 7
Gill-rakers	13/15	12/15

& Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Dahl, 1971, *Los Peces del Norte de Colombia*: 124 (distribution; fig'd); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. Colombia, Pacific drainage; R. Cauca, R. San Juan, R. Dagua, R. Patia and R. San Jorge.

Brycon hilarii Valenciennes) 1849

Chalceus hilarii Valenciennes in Cuvier & Valenciennes, 1849, *Hist. Nat. Poiss.* **22**: 246 (description; type locality, Rio San Francisco, Brasil); Castelnau, 1855, *Exped. Amer. Sud. Poiss.* **3**: 68, pl. 36, fig. 1 (Salinas).

Brycon hilarii, Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 336 (reference); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Boulenger, 1900, *Boll. Musei Zool. Anat. comp. R. Univ. Torino* **15** (370): 3 (Carandasiñho); Eigenmann & Ogle, 1907, *Proc. U.S. natn Mus.* **33**: 30 (Paraguay); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Bertoni, 1914, *Fauna Paraguaya,* Peces: 11 (Paraguay); Fowler, 1932, *Proc. Acad. nat. Sci. Philad.*: 357 (Descalvados, Mato Grosso); La Monte, 1935, *Am. Mus. Novit.* **784**: 7 (Rio Jurua); Bertoni, 1939, *Rev. Soc. Cient Parag.* **4** (4): 55 (Paraguay); Thormählen de Gil, 1949, Revta Mus. La Plata ns. **5**, Zool.: 360 (reference); Amaral-Campos, 1950, Papéis *Dep. Zool. S. Paulo* **9** (10): 140 (description; Para; Mato Grosso); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 366, fig. 393 (reference); Gery, 1977, *Characoids*: 339 (reference in key).

Brycon hilarlii (misspelling), Eigenmann & Kennedy, 1903, *Proc. Acad. nat. Sci. Philad.* **55**: 523 (Arroya Trementina, Paraguay).

DISTRIBUTION. Amazon; R. San Francisco, Brasil; R. Paraguay.

Specimens in BMNH collection:

1910.5.26: 19–20 Paraguay R. (Pan de ezucar), Brazil. Pres. Tudor-Grant

Brycon insignis Steindachner, 1876

?Synonym of *Brycon devillei.*

Brycon iquitiensis (Nakashima) 1941

Holobrycon iquitiensis Nakashima, 1941, *Boln. Mus. Hist. nat. Javier Prado,* ano 5 (15): 72–73, fig'd.; Gery, 1977, *Characoids*: 651 (reference in index).

DISTRIBUTION. ?Upper Amazon.

COMMENTS. The reason for placing this species in the 'genus' *Holobrycon* (see p. 41) is not clear and no justification for this action is made by Nakashima. No locality is stated nor is there indication of the number of specimens on which the description is based. This 'species' is probably one which is already known from the Upper Amazon. Gery (1977), refers the species to *Salminus hilarii.*

Brycon juanensis Rendahl, 1941

Synonym of *Brycon meeki.*

Brycon juradoensis Fowler, 1944

Synonym of *Brycon juanensis*, (see Böhlke, 1958), = *B. meeki* (see above).

Brycon labiatus Steindachner, 1880

Brycon labiatus Steindachner, 1880, *Denkschr. Akad. Wiss Wien* **42**: 75, pl. 3, fig. 1 (description; type locality, Cauca, Colombia); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 55 (reference); Steindachner, 1902, *Denkschr. Akad. Wiss Wien* 72: 143 (Barranquilla; Barrancas, R. Lebrija).

Othonophanes labiatus, Eigenmann, 1903, *Smithson. misc. Collns.* **45**: 145 (brief description of the genus); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 431 (reference); Eigenmann, 1922, *Mem. Carnegie Mus.* **9**: 139 (reference); Gery, 1977, *Characoids*: 335, 339 (reference).

DISTRIBUTION. Cauca, Colombia.

COMMENTS. The presence of an external mandibular flap in this species caused Eigenmann (1903) to assign it to a new genus, *Othonophanes.* There is some interspecific variability in the eversion of the lower lip and this cannot be regarded as a 'generic character'.

Brycon lineatus Steindachner, 1866

Synonym of *Brycon orbignyanus*, (see Ringuelet, Aramburu and Aramburu, 1967, pl. 35).

Brycon longiceps Steindachner, 1879

Brycon longiceps Steindachner, 1879, *Anz. Akad. Wiss. Wien* **16**: 150 (brief description, no type locality stated); Steindachner, 1879, *Denschr. Akad. Wiss. Wien* **41**: 156, pl. 1, fig. 5 (Ciudad Bolivar, Venezuela); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 431 (reference; Orinoco); Schultz, 1944, *Proc. U.S. natn Mus.* **95**: 307 (reference); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Apure—Orinoco, Venezuela.

Brycon lucidus (Kner)

This citation appears in Eigenmann, 1912, *Mem. Carnegie Mus.* **5**: 69 as a reference to the species occurring in the Rio Branco. It is obviously an error for *Bryconops lucidus* Kner, 1859.

Brycon lundii Reinhardt, 1874

Brycon lundii Reinhardt, 1874 in Lütken *Overs. K. danske Vidensk. Selsk. Forh.* (3): 135 (description; type locality, Rio das Velhas, Brasil); Lütken, 1875, *K. dansk. Vidensk. Selsk. Skr.* **12**: 221–223, fig'd. (discussion); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 54 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 431 (reference); Steindachner, 1876, *Sber. Akad. Wiss Wien* **74** (9): 585 (description; R. Parahyba); Steindachner, 1917, *Denkschr. Akad. Wiss Wien* **93**: 38 (Barra); Amaral-Campos, 1950, *Papéis Dep. Zool. S. Paulo* **9** (10): 141 (description; R. San Francisco); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 337 (reference); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Gery, 1977, *Characoids*: 335, 339 (reference).

Triurobrycon lundii, Eigenmann, 1909, *Ann. Carnegie Mus.* **6** (1): 33; Godoy, 1975, Peixes do Brasil **2**: 288 (description).

DISTRIBUTION. Rios das Velhas, São Francisco and Parahyba, S.E. Brazil.

COMMENTS. Eigenmann (1909) erected the genus *Triurobrycon* to contain *B. lundii*. The basis for his generic separation was the elongate middle caudal fin rays of this species. This, however, is a feature of several other Amazonian species and by itself cannot be used to separate taxa. There are admittedly indications that the group of species with extended mid caudal rays share dental and other derived osteological characters (see p. 46) and it may be that when interrelationships of the various species groups are better understood generic status will have to be recognized.

Lütken (1875) compared *B. lundii* with *B. orthotaenia* and considered the possibility that they were synonymous. The only differences Lütken found between the species were the absence of inner symphysial teeth in the lower jaw of *B. orthotaenia*, and the difference in lateral line scale counts (59–61 in *B. lundii* cf. 53 in *B. orthotaenia*). Lütken used Günther's (1864) description for his data on *B. orthotaenia*.

The lack of inner teeth in the lower jaw of the type specimen of *B. orthotaenia* is an artefact, and the lateral scales number 48–49 in standard length (see p. 41). Lütken's lateral line count of 59–61 for *B. lundii* is obviously arrived at by extending the count to the base of the caudal fin. A standard length count of Lütken's figure gives 49–50 scales which is in accordance with that of *B. orthotaenia*.

Doubtless when direct comparison is made between the types of *B. lundii* and *B. orthotaenia* they will be found to be conspecific.

Brycon matrinchao Fowler, 1941

Brycon matrinchao Fowler, 1941, *Proc. Acad. nat. Sci. Philad.* **93**: 192, fig. 102 (description; type locality, Rio Parnaiba, Terezina, Piaui); Thormählen de Gil, 1949, *Revta Mus. La Plata* ns **5** Zool.: 360 (reference); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 337 (reference); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Gery, 1964, *Vie et Milieu* suppl. 17: 450 (in key); Gery, 1977, *Characoids*: 338 (in key).

DISTRIBUTION. R. Parnaiba, Brazil.

COMMENTS. This species is possibly conspecific with *Brycon brevicauda*.

Brycon medemi Dahl, 1960

Brycon medemi Dahl, 1960, *Caldesia* **8** (39): 461, fig'd. (description; type locality, Quebradas La Noche & Unguia, Upper & Lower Atrato, Colombia); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Atrato, Colombia.

COMMENTS. Dahl (1960) states that the dentition of this species is reminiscent of *B. alburnus* and *B. atrocaudatus*. His description would suggest closer affinity to *B. atrocaudatus*. He also mentions intraspecific variation between those specimens from lower and upper parts of the river.

Brycon meeki Eigenmann & Hildebrand, 1917

Brycon meeki Eigenmann & Hildebrand, 1917, *Proc. Amer. Philos. Soc.* **56** (7): 688 (description; type localities, R. San Juan, R. Dagua, R. Patia, Colombia); Eigenmann, 1922, *Mem. Carnegie Mus.* **9** (1): 133, pl. 23, fig. 4 (Colombian localities); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Weitzman, 1962, *Stanford Ichthyol. Bull.* **8** (1): 1–77 (description of osteology); Gery 1977, *Characoids*: 339 (reference in key).

Brycon striatulus (*non* Kner), Regan, 1913, *Ann. Mag. nat. Hist.* (8) **12**: 462 (R. San Juan).

Brycon atricaudatus (*non* Kner), Eigenmann, 1913, *Indiana Univ. Stud.* **18**: 27 (R. Dagua).

Brycon juanensis Rendahl, 1941, *Ark. Zool.* **33A** (4): 10, figs 2 & 3 (description; type locality; Rio San Juan at Cabeceras, Colombia); Böhlke, 1958, *Proc. Acad. nat. Sci. Philad.* **110**: 61 (reference and synonymy); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference).

Brycon (Chalcinopsis) juradoensis Fowler, 1944, *Proc. Acad. nat. Sci. Philad.* **96**: 232, figs 5 & 6 (description; type locality, R. Juradó, Chocó Province, Colombia.

DISTRIBUTION. Pacific Colombia.

Specimens in BMNH collection:

1924.3.3 : 4–6	Barbacoas	Pres: Rosenberg
1920.6.20 : 59–60	Barbacoas	Pres: Eigenmann
1910.7.11 : 191–92	Boca se Colima, Rio San Juan	Pres: Palmer

COMMENTS. Böhlke (1958) considered that *Brycon juanensis* was a possible synonym of *B. meeki*. I have examined two specimens of *B. juanensis* one of which is labelled as the type (110 mm SL, NRM 10688). Both specimens conform in every respect with the morphology and meristics of *B. meeki*.

Brycon melanopterus (Cope) 1871

Megalobrycon melanopterus Cope, 1871, *Proc. Acad. nat. Sci. Philad.* **23**: 262, pl. 13, fig. 1 (description; type locality, R. Ambyiacu).

Brycon (Megalobrycon) melanopterus, Steindachner, 1876, *Sber. Akad. Wiss. Wien* **74** (1): 590 (Amazonas).

Brycon melanopterum, Eigenmann & Eigenmann, 1892, *Proc. U.S. natn Mus.* **14**: 55 (reference); Fowler, 1906 (1907), *Proc. Acad. nat. Sci. Philad.* **58**: 447 (Peruvian Amazon); Fowler, 1942, *Boln. Mus. Hist. nat. Javier Prado* 22–23: 370, fig. 47 (R. Ambyiacu); Amaral-Campos, 1950, *Papéis Dep. Zool. S. Paulo* **9** (10): 142 (description; Tapajoz, Amazon).

Brycon melanopterus, Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 337–8 (reference and synonymy).

Brycon melampterum (misspelling), Eigenmann & Allen, *Fishes of Western South America*: 253 (Peruvian localities).

DISTRIBUTION. Upper Amazon.

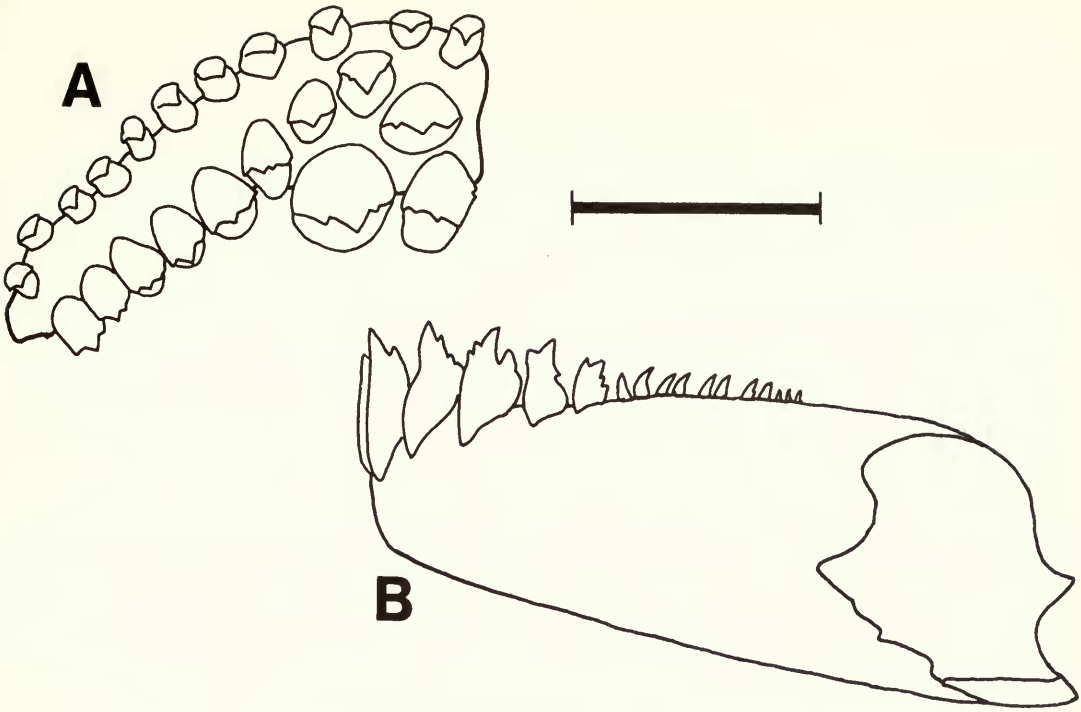
COMMENTS. Fowler (1950) includes, with a query, *Brycon siebenthalae* Nakashima, 1941; however, see remarks on p. 44.

Brycon melanoxanthus Heckel, 1860

Synonym of *Brycon orbignyanus*.

Brycon microlepis Perugia, 1897

Brycon microlepis Perugia, 1897, *Annali Mus. civ. Stor. nat. Giacomo Doria* **38**: 149 (description; type locality, Bahia Negra, Chaco boreal, Upper Paraguay); Eigenmann, McAtee & Ward, 1907, *Ann. Carnegie Mus.* **4**: 153 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Bertoni, 1914, *Fauna Paraguaya* Peces: 11 (reference; Paraguay); Bertoni, 1939,



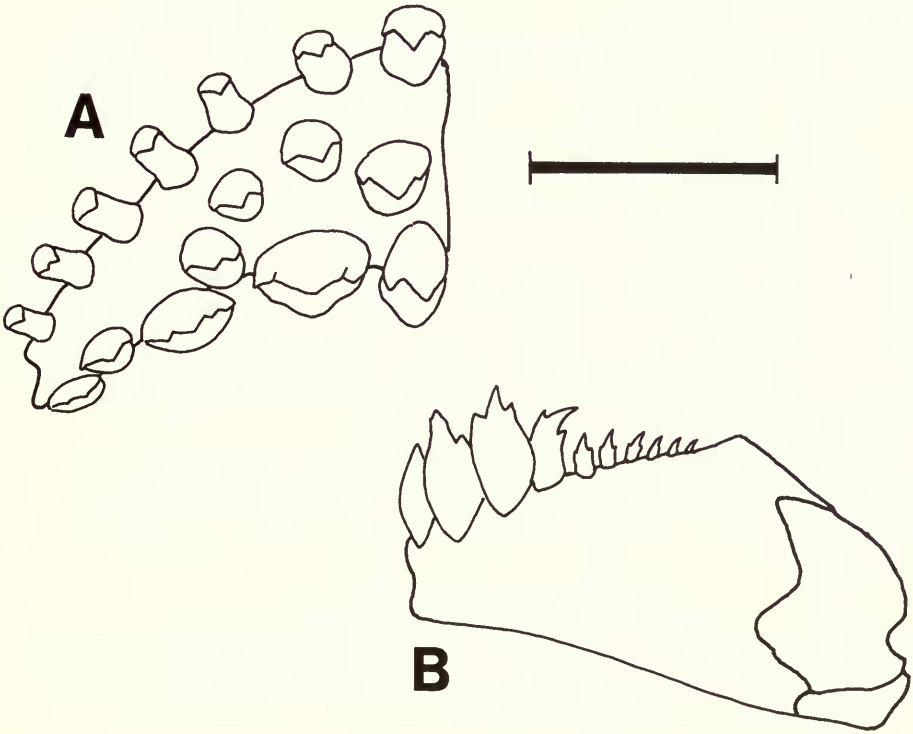


Fig. 20 (upper) A, *Brycon moorei*, occlusal view of right premaxilla; B, lateral view of left dentary. **Fig. 21** (lower) *Brycon oligolepis* A, right premaxilla; B, left dentary in lateral view. Scales = 5 mm.

Revta Soc. cient. Paraguay **4** (4): 55 (reference; Paraguay); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 338; Gery, 1977, *Characoids*: 338 (reference in key).

DISTRIBUTION. R. Paraguay.

Brycon moorei Steindachner, 1878

Brycon moorei Steindachner, 1878, *Denkschr. Akad. Wiss. Wien* **39**: 58, pl. 5, figs 2 and 2b (description; type locality, Rio Magdalena); Steindachner, 1880, *Denkschr. Akad. Wiss. Wien* **42**: 78 (Cauca R. near Caceres); Eigenmann, 1922, *Mem. Carnegie Mus.* **9** (1): 138 (description); Miles, 1947, *Los Peces del Rio Magdalena*: 160–161, fig. 115 (description; Rio Magdalena; Upper and lower Cauca); Gery, 1977, *Characoids*: 339 (reference in key).

Two subspecies are recognized by Dahl:

Brycon moorei moorei, Dahl, 1971, *Los Peces del Norte de Colombia*: 123. *Othonophanes bolivarensis* Dahl, 1942, *K. fysiogr. Sallsk. Lund Forh.* **12** (18): 215–216 (description; Magdalena); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* **7** (4): 103 (reference). *Brycon bolivarensis*, Gery, 1977, Characoids: 339 (reference in key)

Brycon moorei sinuensis Dahl, 1955, *Rev. Linneana* **1**: 11–19 (not seen).

DISTRIBUTION. Magdalena and Cauca systems, Colombia.

COMMENTS. Dahl (1955; 1971) distinguishes two subspecies based on the number of lateral line scales (55–60 in *B. m. moorei* and 63–68 in *B. m. sinuensis*).

There are two specimens in the BMNH collections which display these differences. One from the Upper Cauca has 66 lateral line scales, the other from Barranquilla has 55. The former specimen is also more slender bodied, its depth being 28% of the standard length compared with 32% for the second specimen. Premaxillary dentition shown in Fig. 20. Specimens in BMNH collection:

1900.1.30 : 39	Barranquilla	Pres. K. Thomson	(250 mm SL)
1947.7.1 : 1	Upper Cauca	Pres. C. Miles	(180 mm SL)

Brycon nattereri Günther, 1864

Chalceus opalinus (non Cuvier) Kner, 1860, *Denkschr. Akad. Wiss. Wien* **18**: 10.

Brycon nattereri Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 334 (based on Kner's description, no specimen seen by Günther; type locality, Irisanga); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 431 (reference); Bertoni, 1914, *Fauna Paraquaya,* Peces: 11 (reference; Paraguay); Bertoni, 1939, *Revta Soc. cient. Paraguay* **4** (4): 55 (reference; Paraguay); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 338 (reference); Amaral-Campos, 1950, *Papéis Dept. Zool. S. Paulo* **9** (10): 139 (description; Rio Tiete); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. Parana.

COMMENTS. The identity of this taxon must remain in doubt until Kner's specimen can be examined. It seems likely that *B. nattereri* represents either *B. orthotaenia* or *B.* '*orbignyanus*' (see p. 39).

Brycon obscurus Hildebrand, 1938

Brycon obscurus Hildebrand, 1938, *Fieldiana Zool.* **22** (4): 283, fig. 6 (description; type locality, El Valle, Pacific slope, Panama); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* **7**: 103 (reference); Miller, 1966, *Copeia* (4): 785 (reference, distribution); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. El Valle, Pacific slope of Panama.

COMMENTS. According to Hildebrand (1938) this species is closely related to *B. petrosus* of the Atlantic slope drainage.

Brycon oligolepis Regan, 1913

Brycon oligolepis Regan, 1913, *Ann. Mag. nat. Hist.* (8) **12**: 462 (description: type localities, Rio Condoto and Western Ecuador); Eigenmann, 1922, *Mem. Carnegie Mus.* **9**: 136, pl. 22, fig. 3 (synonymy, description, discussion and Colombian localities listed); Fowler, 1945, *Proc. Acad. nat. Sci. Philad.* **97**: 103 (description; Cauca, Colombia); Böhlke, 1958, *Proc. Acad. nat. Sci. Philad.* **110**: 70 (discussion).

Brycon atrocaudatus (part), Boulenger, 1898, *Boll. Mus. Zool. Anat. comp. R. Torino* **13** (329): 3 (Rio Mira & Rio Peripa).

DISTRIBUTION. Pacific slope of Colombia and Esmeraldas region of Ecuador.

COMMENTS. The only specimens labelled as 'types' are two juveniles (BMNH 1913.10.1 : 8–9; 39·5 & 52·5 mm SL; Rio Condoto; collected by Spurrell). Regan (1913) based his description on 'Nine specimens, up to 220 mm total length, from the Rio Condoto (Spurrell) and Western Ecuador (Rosenberg)'.

In fact the total number of specimens deriving from these localities collected by Spurrell and Rosenberg totals only 7. These specimens I consider to constitute the type series.

Table 13 Counts and proportional measurements for 2 specimens of *Brycon orthotaenia*, including the holotype and 2 specimens of *Brycon 'orbignyanus'*.

	Brycon orthotaenia		*Brycon 'orbignyanus'*	
	Holotype (half-skin) BMNH 1861.5.16 : 71, SL (mm) 330	BMNH1924.6.2:3 SL 314 mm	BMNH1927.2.9:7 SL 248 mm	BMNH1876.6.8:22 SL 298 mm
D	33·0	37·0	33·0	32·0
S–D	53·0	52·0	50·0	54·0
H	21·0	24·0	23·0	22·0
Sn	27·0	33·5	30·0	31·0
IO	–	31·5	41·5	42·0
Mth	–	33·2	32·0	38·0
CpL	10·5	11·2	10·5	12·5
CpD	11·0	10·8	12·0	11·2
PL	Broken	19·4	19·3	19·6
VL	Broken	16·7	16·5	16·8
AL	24·0	26·0	22·6	22·9
DL	Broken	19·2	19·0	20·0
P–V	27·0	24·0	26·0	26·0
PP–V	–	81·0	81·0	75·0
Scales	10/48/8	11/49/9	12/52/9	12/51/10
Dorsal	ii 8	ii 9	ii 9	ii 9
Anal	iv26	iv 26	iv 25	iv 25
Pectoral	i 12	i 12	i 14	i 14
Ventral	i 7	i 7	i 7	i 7
Gill-rakers	–	13/16	15/15	15/15
Vertebrae	–	25 + 21	28 + 21	28 + 20
Supraneurals	–	9	12	12
Teeth:				
Pmx 1	11	10	10	14
2	7	8	10	13
3	2	2	2	2
Max	22	16	15	12
Dent	8/10	7/9	15/6	16/8

Böhlke (1958), stressed the need to determine the specific distinctness of *Brycon dentex* and *Brycon oligolepis*, believing that the type series of *B. oligolepis* 'is possibly a composite'. Although possibly a composite it does not include specimens of *Brycon dentex* which is a quite distinct species (see p. 21 and compare Figs 13, 14, 15 & 21).

The counts and proportions for the types are given in Table 14.

The type specimens from the Rio Condoto and Rio Paramba (N. Ecuador) appear to be conspecific but there are differences between these and a specimen from the Rio Durango (79° 45′ W, 1° 4′ N) a sub-tributary of the Rio Santiago, Esmeraldas Prov. This specimen has a wide interorbital (40% of the head length) and a long pectoral fin (96% of the pectoral-ventral distance). The dorsal surface and paired fins are very dark (although this may simply be the result of preservation). Böhlke listed a specimen of *Brycon posadae* Fowler from the Rio Durango which, as far as I can tell, shows close affinity to the BMNH specimen. Thus I would provisionally regard the Rio Durango specimen as being *B. posadae*.

Another specimen, from the Rio Mira (BMNH 1898.11.4 : 77), has a wide interorbital (40% of the head length), but in this case the pectoral fin is short being only 74% of the pectoral-pelvic distance.

The proportions for Rio Peripa specimens (BMNH 1898.11.4 : 75–76) fall within the ranges for the Colombian and Paramba specimens, except for the slightly longer head (with very narrow 4th infraorbital) and shorter caudal peduncle length. There is also a slight difference in colouration, in that the caudal peduncle blotch extends further forward than in other *B. oligolepis*. Until more material is available and the degree of variation known, these specimens are referred to *B. oligolepis*. Meanwhile I propose that the type locality of this species should be restricted to the Rio Condoto, Colombia. The type specimens from this locality appear to match well with other specimens from R. Telembi I have examined and with the descriptions of those specimens collected by Eigenmann (1922) from the same Colombian localities.

As pointed out by Böhlke, Tortonese (1939, *Boll. Mus. Zool. Anat. comp. Torino* **47**: 49) re-identified a specimen from the Rio Zamora as *Brycon oligolepis*, an identification that seems suspect.

Regan (1913) separated *B. oligolepis* from *B. atrocaudatus* on its fewer lateral line scales (44–48 cf. 54–55) and 'larger head'. However, Regan's comparative material of *B. atrocaudatus* has subsequently been determined as *B. moorei*.

Brycon opalinus (Cuvier) 1817

Chalceus opalinus Cuvier, 1817, *Mem. Mus. Hist. nat. Paris* **5**: 351, pl. 26, fig. 1 (description; type locality, 'Brasil'); Valenciennes in Cuvier & Valenciennes, 1849, *Hist. Nat. Poiss.* **22**: 244 (Rio Tiquilenhonha (= Jequitinhonha)).

Brycon opalinus, Müller & Troschel, 1844, *Arch. Naturgesch.* (1): 90 (brief description; Brasil); Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 334 (reference); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped.* **3** (4): 431 (reference); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 338 (reference, synonymy); Gery, 1977, *Characoids*: 342 (reference in key).

DISTRIBUTION. Uncertain.

COMMENTS. See remarks under *Brycon amazonicus*.

Brycon orbignyanus (Valenciennes) 1849

Chalceus orbignyanus Valenciennes, 1849 in Cuvier & Valenciennes, *Hist. Nat. Poiss.* **22**: 249 (description; type locality, La Plata).

Brycon orthotaenia Günther, 1864

Brycon orthotaenia Günther, 1864, *Cat. Fish Brit. Mus.* **5**: 335 (description; type locality, Rio Cipo, Brasil).

COMMENTS. These two species are treated together because in the past *Brycon orthotaenia* has been placed in the synonymy of *B. orbignyanus* along with *B. rodopterus* (Val.) 1849, and *B. lineatus* Steindachner, 1866. No synonymy is presented here because until the types of all these species have been compared any such compilation will be virtually useless.

Brycon orthotaenia is a species distinct from that described under the name of *B. orbignyanus* by various authors (Devincenzi, 1942 in Devincenzi & Teague, *An. Mus. Hist. nat. Montevideo* (2) **5** (4): 73; Thormählen de Gil, 1949, *Revta Mus. La Plata* ns **5** (35) Zool.: 355–364; Ringuelet, Aramburu & Aramburu, 1967, *Los Peces Argentinos de agua dulce*: 135–136). Amaral-Campos (1950, *Papéis Dep Zool. S. Paulo* **9** (10): 139) considered *B. orthotaenia* to be distinct from *B. orbignyanus*, although the characters he used to separate them were rather tenuous, being based only on Günther's description of *B. orthotaenia*.

The holotype of *B. orthotaenia* is a half-skin of approximately 330 mm SL. It is still in a reasonable condition; the scale rows are almost complete as is the dentition and skull bones of the left side. The distal margins of the fins are broken away and the caudal fin is almost parted from the body; however, the hypural bones are complete.

The type locality is the Rio Cipo, a tributary of the Itapicuru, eastern Brasil; a river system without connection to the Parana-Paraguay, the area of distribution of *B. orbignyanus*.

There are 22 teeth along the maxillary; the premaxillary count is 11/7/2 (Fig. 22B). The dentary possesses 8 large tri- or quadri-cuspid teeth followed by 10 small conical ones.

Another specimen in the BMNH collection (1924.6.2 : 3) from the Rio das Velhas, accords well with the proportions and other morphological features of the type. In this specimen there is a rather large horizontal oval humeral patch, which is only just visible on the type skin. A wide dark band extends along the lateral midline of the caudal peduncle from below the adipose fin to reach the edge of the medial caudal fin rays.

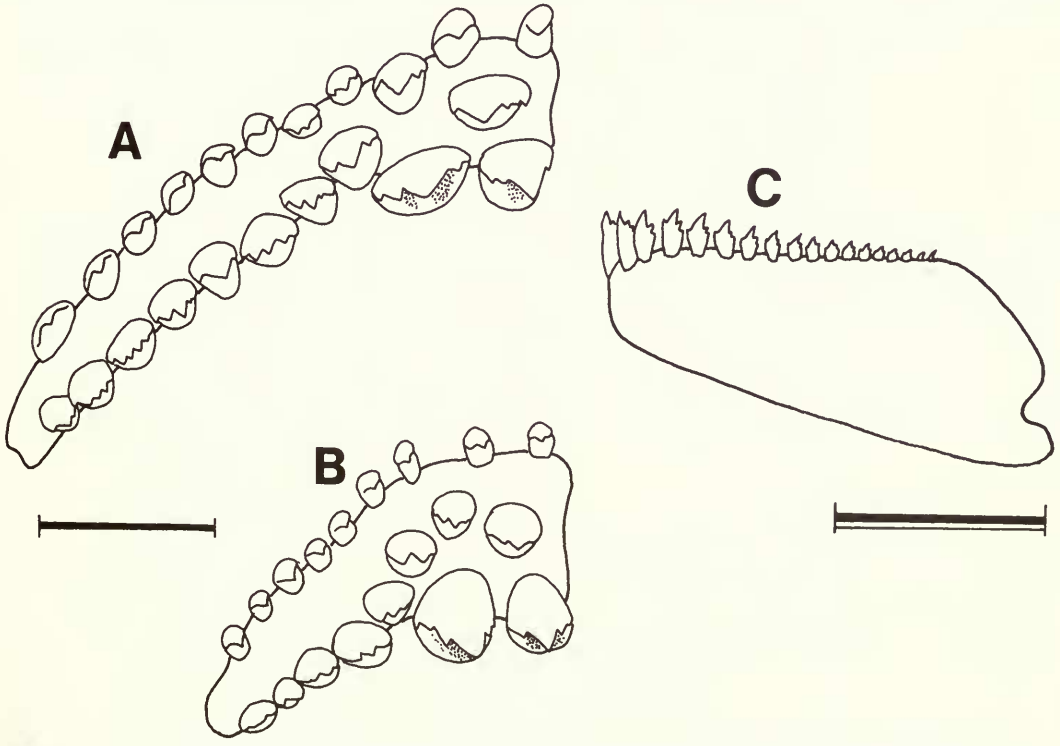


Fig. 22 A, *Brycon orbignyanus*, right premaxilla from specimen BMNH 1927.2.9 : 7–9, 248 mm SL; B, *Brycon orthotaenia*, right premaxilla from specimen BMNH 1924.6.2 : 3; 314 mm SL; C, *Brycon orbignyanus*, left dentary in lateral view from specimen BMNH 1927.2.9 : 7–9 (posterior border drawn from a radiograph). Scales: solid = 5 mm, divided = 10 mm.

Other specimens in the BMNH collections labelled as *B. orthotaenia* differ in several respects from the type and from the Rio das Velhas specimen. These I tentatively refer to *B. orbignyanus* (BMNH 1876.6.8 : 22; 1927.2.9 : 7; 1946.12.13 : 136–7).

In these specimens the body is less deep and the interorbital width narrower. The most noticeable difference is in the dentition where the 1st row of premaxillary teeth numbers 10–14, the 2nd row totals 10–13, and the dentary has 15–16. Although the total number of dentary teeth is the same as that in *B. orthotaenia*, they are gently graded instead of having the more abrupt gradation found in *B. orthotaenia* and other *Brycon* species (see Figs 22A & B). The lower jaw is long and shallow (Fig. 22C) and the upper and lower jaws are almost subequal whereas in *B. orthotaenia* the upper jaw strongly projects beyond the lower. In *B. orthotaenia* the maxillary valve tissue is thick and strongly folded as in *B. falcatus* thus contrasting with the highly convulted and papillose tissue of *B. orbignyanus*. In *B. orbignyanus* there is also a high number of abdominal vertebrae (28 cf. 25 in *B. orthotaenia*), of supraneurals (12 cf. 9) and of pectoral fin rays (14 cf. 12).

Further differences are seen in colouration. In *B. orbignyanus* dark bands run in zig-zag fashion between the scale rows. The paired fins and the dorsal and anal are all well-pigmented. The dark caudal band extends from a point posterior to the origin of the adipose fin.

Table 14 Counts and proportional measurements for the syntypes of *Brycon oligolepis*.

	BMNH 1913.10.1 : 8–9; BMNH 1914.5.18 : 5; Rio Condoto. SL (mm) 52·5, 39·5, 157		BMNH 1898.10.26 : 30–31; 1898.4.28 : 167; Rio Paramba. SL (mm) 146·5, 133, 70·5		BMNH 1902.5.27 : 50; Rio Durango. SL (mm) 180
	Range	Mean	Range	Mean	
D	31·0–33·0	31·8	29·5–31·0	30·0	30·5
S–D	54·5–56·0	55·0	53·0–55·0	54·3	53·0
H	24·5–27·0	26·1	24·5–28·2	26·6	25·0
Sn	23·3–28·5	26·4	25·0–26·2	26·3	29·0
IO	31·0–39·0	32·6	30·0–37·5	33·3	40·0
Ey	23·5–38·0	32·0	25·9–31·5	27·8	24·5
Mth	26·0–28·0	26·6	22·2–27·5	25·1	32·0
CpL	12·4–14·4	13·1	10·9–17·0	13·8	13·0
CpD	9·5–10·1	9·8	9·8–10·2	9·9	10·2
PL	18·5–19·5	19·0	20·0–23·1	21·5	19·8
VL	13·4–15·3	14·6	15·0–16·3	15·6	15·3
AL	25·9–28·0	26·2	22·6–26·2	24·6	27·0
DL	16·5–19·0	18·1	18·5–22·0	20·0	17·2
P–V	23·0–26·5	25·2	24·0–26·0	25·1	20·5
PP–V	83·0–91·0	76·3	83·0–91·0	86·0	96·0
Scales	9/45, 46, 49/7		8/45, 45, 46/7		8/45/7
Dorsal	ii 9		ii 9		ii 9
Anal	iv 25 (f2), iv 26 (f1)		iv 26 (f2), iv 28 (f1)		iv 26
Pectoral	i 12		i 12		i 12
Ventral	i 7		i 7		i 7
Gill-rakers	12/13		12/14		11/13
Vertebrae	24 + 19 (f2), 24 + 20 (f1)		23 + 21 (f2), 22 + 21 (f1)		23 + 21
Supraneurals	12		10		10
Teeth:					
Pmx 1	7–8		7–8		7
2	7		7–8		7
3	2		2		2
Max	13 (f2), 15 (f1)		14 (f2), 15 (f1)		18
Dent	6–7/6–8/1		7–8/6/10/1		9/10/1

Günther counted 53 scales in the lateral line on the type of *B. orthotaeniá* (that is, including those extending on to the caudal fin). Counting to the standard length, the total is 48 or 49. Counting to the standard length in *B. orbignyanus* the lateral line scales are 51–52 (cf. Thormählen de Gil, 1949 : 53–59). Günther (1863) also pointed out the marked ramification of the lateral line canal in those scales through which it passed. This character is not present in *B. orbignyanus.*

Boulenger (1897, *Boll. Mus. Zool. Anat. comp. Univ. R. Torino* **12** (279): 4) identified some specimens from Caiza, Bolivia as belonging to *B. orbignyanus*. However, these appear to represent a tetragonpterine species which as yet I have been unable to identify.

Brycon rodopterus was included in the synonymy of *B. orbignyanus* by Eigenmann (1910) and *B. lineatus* by Ringuelet, Aramburu & Aramburu (1967). The status of these species is yet to be confirmed.

The genus *Bryconodon* erected by Eigenmann (1903) to contain *B. orthotaenia* is not valid. Eigenmann gives no adequate definition of this genus nor why he considered it to differ from Brycon. In any case he may well have had *B. orbignyanus* in mind. Attention is drawn to the remarks concerning *Brycon lundii* and *Triurobrycon* (p. 33). Should *B. lundii* prove to be the junior synonym of *B. orthotaenia*, and *B. orthotaenia*, *B. orbignyanus* and *B. cephalus* are found to share derived characters which relate them at generic level, then the name *Megalobrycon* Günther, 1869 would have priority.

Counts and proportions of the type and one other specimen of *B. orthotaenia* are listed in Table 13 together with those of specimens of *B. 'orbignyanus'*.

Brycon pellegrini Holly, 1929

Brycon pellegrini Holly, 1929, *Anz. Akad. Wiss. Wien* **66**: 208 (description; type locality, Manaus, Amazon); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 339 (reference); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* **7** (4): 103 (reference); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. Amazon.

COMMENTS. Possibly a synonym of *B. cephalus* Günther.

Brycon pesu Müller & Troschel, 1845

Brycon pesu Müller & Troschel, 1845 *Horae Ichth.* (**1–2**): 16, 30, pl. 7, fig. 1 (description; type locality, Guiana); Regan, 1905, *Proc. Zool. Soc. Lond.*: 190 (Rio Negro; reference to a drawing by Wallace); Steindachner, 1917, *Denkschr. Akad. Wiss. Wien* **93**: 35, pl. 1, fig. 3 (Surinam, Rio Purus, Rio Negro, Rio Branco, Rio Tapajos; reference to Haseman's collection); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 339 (reference and synonymy); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* **7** (4): 103 (reference).

Holobrycon pesu, Eigenmann, 1909, *Ann. Carnegie Mus.* 6: 33 (brief generic description; British Guiana localities); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Eigenmann, 1912, *Mem. Carnegie Mus.* **5**: 369, pl. 54, fig. 1; Gery, 1977, *Characoids*: 335 (reference, fig'd.: 320).

DISTRIBUTION. Guianas; ?Amazon.

COMMENTS. Eigenmann (1909) established the genus *Holobrycon* for *Brycon pesu.* His diagnosis of the genus was 'A *Brycon* without fontanels' (Eigenmann, 1912). In fact, fontanelles are present in this species and from a series of specimens the following observations were made:

Two specimens from Bartica, Guyana, BMNH 1911.10.31 : 347–349, 42 mm SL, fontanelles present; 85 mm SL, frontals closed, parietals open.

Seven specimens from Manaus, Amazon, BMNH 1897.12.1 : 324–331, 33–63 mm SL. Various degrees of separation of the frontals and parietals, but in the largest specimen both frontal and parietal fontanelles are present.

Three specimens from Mato Grosso, uncatalogued, 63, 105 & 117 mm SL, frontal and parietal fontanelles absent.

Regan (1911) commented on the presence of cranial fontanelles and indicated that such features were of very little taxonomic value and were usually absent in those characoids with flattened skulls. Weitzman (1962) found that in the Tetragonopterinae (Characinae of Weitzman), fontanelles became narrower with increased size. Roberts (1969) stated that 'Fontanels are apparently present in the young of all characoids'. If this is so, then open fontanelles may be considered a plesiomorph condition and their closure in *Brycon pesu* a derived feature. Vari, 1979 : 290 considered progressive reduction of the cranial fontanelle to be a derived feature amongst distichodontid characoids.

In dental morphology *Brycon pesu* appears to be a 'typical' *Brycon*, ie. of the *B. falcatus* group (see p. 46), but in general appearance and particularly in the red caudal fin it greatly resembles *Chalceus*.

Brycon petrosus Meek & Hildebrand, 1913

Brycon petrosus Meek & Hildebrand, 1913, *Fieldiana Zool.* **10** (8): 184 (description; type locality, Upper Chagres River, Panama); Meek & Hildebrand, 1916, *Fieldiana Zool.* **10** (15): 297, pl. 24; Hildebrand, 1938, *Fieldiana Zool.* **22** (4): 282 (description; Panamanian localities); Eigenmann, 1922, *Mem. Carnegie Mus.* **9**: 137, pl. 23, fig. 1 (brief description; localities); Myers & Weitzman, 1960, *Stanford Ichthyol Bull.* 7 (4): 103 (reference); Miller, 1966, *Copeia* (4): 785 (reference; distribution); Menezes, 1969, *Papéis Dep. Zool. S. Paulo* **22**: 217–218 (food; distribution given as Panama & Honduras); Gery, 1977, *Characoids*: 339 (reference in key); Kramer, 1978, *Copeia* (3): 535–537 (spawning habits).

DISTRIBUTION. Panama, Atlantic and Pacific slopes.

Brycon posadae Fowler, 1945

Brycon posadae Fowler, 1945, *Proc. Acad. nat. Sci. Philad.* **97**: 105, fig. 5 (description; type locality, Ricaurte, Rio Guebo, tributary of Rio Mira, Colombia); Böhlke, 1958, *Proc. Acad. nat. Sci. Philad.* **110**: 63 (description and discussion); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 103 (reference); Ovchynnyk, 1968, *Zool. Anz.* **181**: 245 (reference; Ecuadorian localities).

DISTRIBUTION. Ecuador and southern Colombia (Pacific slope).

COMMENTS. Reference is made to this species on p. 38 under *Brycon oligolepis*.

Brycon reinhardti Lütken, 1874

Brycon reinhardti Lütken, 1874, *Overs. K. danske. Vidensk. Selsk Forh.*: 134 (description; type locality, central Brasil); Lütken, 1875, *K. dansk. Vidensk. Selsk. Skr.* **12**: 222 (description and discussion; Rio das Velhas); Steindachner, 1875, *Sitz. Akad. Wiss. Wien* **74** (1): 385, pl. 3, figs 3 & 3a (Campos, Juiz de Fora); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Eigenmann & Ogle, 1907, *Proc. U.S. natn Mus.* **33**: 30 (Rio das Velhas); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference). Thormählen de Gil, 1949, *Revta Mus. La Plata* ns. **5** Zool.: 360 (reference); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 340 (reference); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. Rio das Velhas; eastern Brasil.

COMMENTS. Lütken (1875) discussed this species and *Brycon lundii* at some length. He distinguished them from each other on differences in the depth of the body; length of the head; position of the eye; number of lateral line scales and the shape of the maxillaries. Lütken reported that he could find no 'essential differences' in dentition between the two species. Furthermore, he stated (correctly) that neither species could be confused with *Brycon hilarii* but that *B. lundii* could possibly be a synonym of *B. orthotaenia*, an opinion accepted here (p. 33).

Brycon reinhardti has been discussed in association with *B. devillei* and *B. acuminatus*, two species with which it is thought to be closely related.

Counts and proportions of the single specimen in the BM(NH) collection are given in Table 15. Premaxillary dentition is shown in Fig. 23.

Table 15 *Brycon reinhardti* counts and proportions of specimen BMNH 1876.1.10 : 36 (possibly a syntype).

SL (mm) 152·5			
D	28·9	Scales	8/45/5
S–D	57·0	Dorsal	ii 9
H	25·5	Anal	iv 20
Sn	27·0	Pectoral	i 14
IO	37·0	Ventral	i 7
Ey	24·2	Gill-rakers	11/14
Mth	33·2	Vertebrae	23 + 23
CpL	11·8	Supraneurals	10
CpD	9·8	Teeth:	
PL	17·6	Pmx 1	10
VL	15·4	2	9
AL	23·0	3	2
DL	16·4	Max	21
P–V	24·5	Dent	12/17/1
PP–V	72·0		

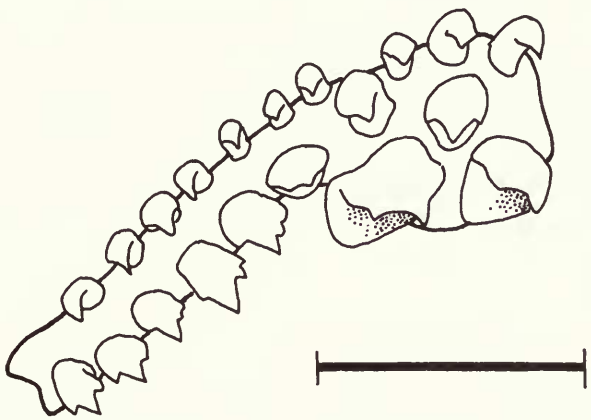


Fig. 23 *Brycon reinhardti*, right premaxilla from specimen BMNH 1876.1.10 : 36 Scale = 3 mm.

Brycon rodopterus (Valenciennes) 1849

Chalceus rodopterus Valenciennes, 1849 in Cuvier & Valenciennes *Hist. Nat. Poiss.* **22**: 249 (description; type locality, Buenos Aires).

Brycon rhodopterus, Eigenmann & Eigenmann, 1891, *Proc. U.S. natn. Mus.* **14:** 55 (reference).

Brycon rodopterus, Lahille, 1895, *Revta Mus. La Plata* **6**: 249 (Rio Santiago); Gery, 1977, *Characoids*: 651 (refers in index to *B. orbignyanus*).

DISTRIBUTION. La Plata.

COMMENTS. Status uncertain, possibly a synonym of *B. orbignyanus.*

Brycon rubricauda Steindachner, 1879

Brycon rubricauda Steindachner, 1879, *Sber. Akad. Wiss. Wien* **80** (1): 18 (description; type locality, Rio Cauca, Colombia); Steindachner, 1880, *Denkschr Akad. Wiss. Wien* **42**: 77, pl. 8, figs 1 & 1a (description Cauca near Caceres); Eigenmann, 1922, *Mem. Carnegie Mus.* **9** (1): 135 (reference and comment); Miles, 1947, *Los Peces del Rio Magdalena*: 159 (Rio Magdalena and lower Cauca); Dahl,

1971, *Los Peces del Norte de Colombia*: 123 (description; distribution); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Magdalena and Cauca, Colombia.

COMMENTS. According to Eigenmann (1922) this species possesses four rows of premaxillary teeth and this caused him to place it near *B. dentex* and *B. meeki*. Possibly it is a synonym of *B. meeki*.

Brycon scapularis Fowler, 1911

Synonym of *B. atrocaudatus* (see Böhlke, 1958).

Brycon schomburgkii Müller & Troschel, 1844

Synonym of *B. falcatus* (see Eigenmann, 1912).

Brycon siebenthalae Eigenmann, 1912

Brycon siebenthalae Eigenmann, 1912, *Mem. Carnegie Mus.* **5**: 372, pl. 44, fig. 3 (description; type locality, Aruka River, British Guiana); Gery, 1977, *Characoids*: 338 (reference; fig. of tooth pattern).

DISTRIBUTION. Aruka River, Guyana.

COMMENTS. Nakashima (1941, *Boln. Mus. Hist. nat. Javier Prado* ano 5, **16**: 70) described two taxa which he named *B. siebenthalae* and *B. siebenthalae iquitensis* from the Upper Amazon; no exact locality was given. Eigenmann & Allen (1942, p. 254) treated these as *Brycon* sp.; Fowler (1950) tentatively placed them in the synonymy of *B. melanopterus*. The descriptions are too poor to allow identification. It is possible that these fish represent *B. stubelli*, but Nakashima gives a lateral line scale count of 72 cf. 57–58 for *stubelli*; the description is also at variance with the figure labelled as *B. siebenthalae*. In view of these and other errors (see under *B. falcatus* and *B. iquitiensis*) these taxa must remain *species inquirenda*.

Brycon stolzmanni Steindachner, 1879

Brycon stolzmanni Steindachner, 1879, *Denkschr. Akad. Wiss. Wien* **41**: 70, pl. 2, figs 6a & 6b (description; type locality, Chota, R. Marañon, Peru); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Pearson, 1937, *Proc. Cal. Acad. Sci.* (4) **22**: 90 (Paipay, Tingo de Paura, Pusoc, Peru); Fowler, 1942, *Boln. Mus. hist. nat. Javier Prado* ano 6 **22–23**: 372 (reference); Eigenmann & Allen, 1942, *Fishes of Western South America*: 254 (reference); Fowler, 1945, *Los Peces del Peru*: 150 (reference); Thormählen de Gil, 1949, *Revta Mus. La Plata* ns **5** Zool.: 364 (reference; distribution); Fowler, 1950, *Archos Esta Zool. S. Paulo* **6**: 340 (reference); Gery, 1977, *Characoids*: 342 (reference in key).

DISTRIBUTION. Peruvian Amazon and Pacific slope of Peru.

Brycon striatulus (Kner & Steindachner)

Chalcinopsis striatulus Kner & Steindachner, 1863 in Kner *Sber. bayer. Akad. Wiss. Munchen*: 226 (description; type locality, Panama); Kner & Steindachner, 1865 *Abh. bayer. Akad. Wiss. Munchen* **10**: 38–41, pl. 5, fig. 2 (description; locality 'Neu Granada & Panama').

Brycon striatulus, Steindachner, 1876, *Sitz. Akad. Wiss Wien* **74** (9): 590 (discussion of *Chalcinopsis*); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Jordan & Evermann, 1896, *Proc. U.S. natn. Mus.* **47** (1): 337 (description; distribution); Eigenmann & Ogle, 1907, *Proc. U.S. natn. Mus.* **33**: 30 (Aspinwall, Panama); Regan, 1908, *Biologia Centrali Americana,* Pisces: 169 (description; Costa Rica, Juan Vinas & El Poso del Rio Grande); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference); Meek, 1914, *Fieldiana Zool.* **10** (10): 109 (Costa Rican localities); Meek & Hildebrand, 1916, *Fieldiana Zool.* **10** (15): 294 (Rio Chorrera, R. Juan Diaz; R. Bayano; Tuyra basin); Eigenmann, 1922, *Mem. Carnegie Mus.* **9** (1): 139 (description; R. Frijoles; R. Fugra); Breder, 1927, *Bull. Am. Mus. nat. Hist.* **57**: 119 (reference: R. Tuyra); Hildebrand, 1938,

Fieldiana Zool. **22**: 276 (reference and comment); Thormãhlen de Gil, 1949, *Revta Mus. La Plata* ns **5** Zool.: 359 & 364 (reference; description); Hubbs, 1953, *Copeia* (3): 142–143 (comment on authorship); Miller, 1960, *Copeia* (4): 785 (reference; distribution); Bussing, 1966, *Revta Biol. Trop.* **14** (2): 236 (reference: Costa Rica); Gery, 1977, *Characoids*: 339 (reference in key).

DISTRIBUTION. Central and eastern Panama, Pacific slope; Costa Rica, Pacific and Atlantic slopes.

COMMENTS. This species was made the type of the genus *Chalcinopsis* by Kner & Steindachner (1863), being distinguished from *Brycon* mainly by the shape of the ventral surface of the body. Günther (1864) followed this generic concept and included the species *dentex, chagrensis* and *alburnus* in that genus. Steindachner (1876) reduced *Chalcinopsis* to subgeneric status and mistakenly synonymised *B. chagrensis* and *B. striatulus.*

Chalcinopsis has been resurrected by Gery (1972); see p. 6.

Boulenger (1898, *Boll. Mus. Zool. Anat. comp. R. Torino* **13** (329): 4) recorded *Brycon striatulus* from Rio Santiago, eastern Ecuador, an identification confirmed by Tortonese (1939, *Boll. Mus. Zool. Anat. comp. R. Torino* **47** (3) n. 89: 50). These erroneus identifications were pointed out by Böhlke (1958). I am unable at this stage to say which species Boulenger's specimen represents.

Brycon stubelii Steindachner, 1882

Brycon stubelii Steindachner, 1882, *Anz. Akad. Wiss. Wien* **19** (18): 176 (description; type locality, Amazonas); Steindachner, 1882, *Denkschr. Akad. Wiss. Wien* **46** (1): 13, pl. 1, fig. 1 (Amazon at Iquitos); Eigenmann & Eigenmann, 1891, *Proc. U.S. natn Mus.* **14**: 55 (reference); Eigenmann, 1910, *Rep. Princeton Univ. Exped. Patagonia* **3** (4): 430 (reference, spelt as *stubeli*); Fowler, 1942, *Boln Mus. Hist. nat Javier Prado* ano **6** (22–23): 372 (reference; Iquitos); Eigenmann & Allen, 1942, *Fishes of Western South America*: 253 (reference); Fowler, 1945, *Los Peces del Peru*: 149 (reference); Thormãhlen de Gil, 1949, *Revta Mus. La Plata* ns **5** Zool.: 364 (reference; distribution); Gery, 1966, *Vie et Milieu* supple. 17: 450 (reference in key).

DISTRIBUTION. Peruvian Amazon.

COMMENTS. *Brycon stubelii* is possibly a synonym of *B. falcatus*. The major difference between the species appears to lie in the numbers of lateral line scales, given in Steindachner's description as 57–58. This count is made to the caudal base; a standard length count of Steindachner's (1882) illustration gives 52, and is thus in agreement with that of *B. falcatus*. Gilbert & Roberts (1971) have recorded *B. falcatus* from the Upper Amazon (see p. 28).

Brycon tovari Dahl, 1960

Brycon tovari Dahl, 1960, *Caldesia* **8** (39): 465 (description; type locality, R. Sando, tributary of R. Baudo, Colombia); Gery, 1977, *Characoids*: 339 (reference).

DISTRIBUTION. Western Colombia.

COMMENTS. Possibly a synonym of *B. meeki.*

Brycon travassosi Amaral-Campos, 1950

Brycon travassosi Amaral-Campos, 1950, *Papéis Dep Zool. S. Paulo* **9** (10): 141 (description; type locality, Bodoquena, Mato Grosso); Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* **7** (4): 103 (reference); Gery, 1977, *Characoids*: 338, 342 (reference, regarded as possible synonym of *B. lineatus*).

DISTRIBUTION. Mato-Grosso, Brasil.

COMMENTS. Possibly a synonym of *B. orbignyanus.*

Brycon whitei Myers & Weitzman, 1960

Brycon whitei Myers & Weitzman, 1960, *Stanford Ichthyol. Bull.* 7 (4): 99, fig. 1 (description; type locality, Rio Guaviare, Orinoco system, Colombia); Cala, 1977, *Lozania* (24): 1–21 (reference: Rio Guaviare, Colombia); Gery, 1977, *Characoids*: 335, 339 (reference).

DISTRIBUTION. Orinoco system, Colombia.

Species groups

Within *Brycon* as presently recognized, at least five species assemblages can be identified; these are:

1. *Brycon falcatus* group; characterized by a deep body; broad cranium; deep orbitosphenoid septum; small rhinosphenoid; posteriorly elongate epioccipital process; long maxilla with 19–24 teeth; premaxilla with wide dentigerous surface, the teeth in 3 rows, the 3rd row teeth large; lower jaw short and deep; lateral line scales 43–58; vertebrae 41–48; body markings usually as well-defined horizontal lines.
   INCLUDED SPECIES: *B. falcatus, B. brevicauda, B. bahiensis, B. cephalus, B. carpophagus, B. orthotaenia, B. siebenthalae, B. moorei, B. hilarii* and ?*B. bicolor.*
   DISTRIBUTION: Amazon basin.

2. *Brycon acuminatus* group; characterized by a slender body, long, rather pointed snout; narrow cranium; shallow orbitosphenoid septum; reduced rhinosphenoid; long maxilla with 20–30 teeth; premaxilla with narrow dentigerous surface, the teeth with modified triserial arrangement, inner teeth with elongate central, and reduced lateral cusps; lower jaw long and shallow; lateral line scales 45–51; vertebrae 44–48; body markings as humeral and caudal spots.
   INCLUDED SPECIES: *B. acuminatus, B. ferox, B. reinhardti, B. devillei.*
   DISTRIBUTION: South-east Brazil.

3. *Brycon orbignyanus* group; characterized by a long and deep body; long but blunt snout; broad cranium with anteriorly convex frontals; short maxilla with 12–15 teeth; premaxilla with wide dentigerous surface, outer row teeth numerous 12–15, cf. 6–10 in other species groups; lower jaw with regularly graded teeth; lateral line scales 50–52; vertebrae 48–49; supraneural 12; body marked with horizontal or zig-zag lines, a caudal spot and central caudal fin bar.
   INCLUDED SPECIES: *B. orbignyanus*, and ?*B. microlepis.*
   DISTRIBUTION: Parana-Paraguay.

4. *Brycon alburnus* group; characterized by a slender body; elongate pointed snout; narrow cranium; shallow orbitosphenoid septum; small rhinosphenoid; long maxilla with over 20 teeth; premaxilla with narrow dentigerous surface, teeth compressed with elongate central cusp, modified triserial arrangement; premaxillary symphysial joint weakly developed or syndesmotic; lower jaw long and shallow; lateral line scales 56–63; vertebrae 43–46; high number of supraneurals, 10–13; body with humeral and caudal spots.
   INCLUDED SPECIES: *B. alburnus, B. atrocaudatus* and ?*B. ecuadoriensis.*
   DISTRIBUTION. Ecuador.

5. *Brycon guatemalensis* group; characterized by an elongate body; narrow cranium; tubular olfactory foramen in the lateral ethmoid; large rhinosphenoid; short maxilla with 10–15 teeth; premaxilla with wide dentigerous surface, teeth in 3 or 4 rows; lower jaw short and deep; gill-rakers usually numerous, 12–14 on ceratobranchial; anal fin long with 30–38 branched rays, cf. 21–32 in other groups; lateral line scales 50–70, cf. 45–46 in other groups; vertebrae *ca* 45.
   INCLUDED SPECIES: *B. guatemalensis, B. striatulus* and all Panamanian, Central American and Pacific Colombian species (eg. *B. meeki, B. oligolepis, B. rubricauda*).

It must be pointed out that the above grouping does not imply that these are considered as monophyletic units. The characters used have yet to be assessed as plesio- or apomorphic. Furthermore, not all species possess characters which enable them to be included in the groups (eg. *B. dentex*) as here defined. However, it is hoped that this classification will serve as a framework for a more rigorous analysis.

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